The Builder.

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ILLUSTRATIONS.

"Hatchlands," Surrey.—Mr. Halsey Ricardo, Architect ..... *Double-Page Ink-Photo.*
Design for Completion of Campanile, Zara, Dalmatia.—Mr. T. G. Jackson, M.A., Architect ..... *Double-Page Ink-Photo.*
St. Luke's Church, Richmond: Exterior View, Plan, and Interior View.—Messrs. Goldie, Child, & Goldie, Architects ..... *Two Double-Page Photo-Litho's.*

Blocks in Text.

Plan and Section of Part of the Choir, Beauvais Cathedral ..... *Page* 395
Diagrams illustrating House Drainage ("The Student's Column") 398

CONTENTS.

Building Materials 385
Notes 387
Architecture at the Royal Academy.—IV. 388
Pictures at the Paris Salon 389
The Royal Institute of British Architects: The Roman Thermæ 391
The Architectural Association 393
Hatchlands, Surrey 394
Zara, Dalmatia 394
The Church of St. Luke, Richmond 394
A Travelling Student's Notes 394
Architectural Societies 396
Case under the Metropolitan Building Act: Wooden Structures 397
The London County Council 397
Holiday Homes 397
Bootle Police-court Competition 397
The Student's Column. Town Drainage.—XXI. 397
Recent Sales 398
Meetings 398
Miscellanea 399
Civil and Mechanical Engineers' Society 399
British Archæological Association 399
Prices Current of Materials 400

Building Materials.

WE are now presented with a second edition of the third volume of the series of "Notes on Building Construction,"* which have been brought out, with no author's name, as instruction books on practical building work in accordance with the requirements of the Science and Art Department. This third volume deals with the section of materials, including information in regard to stones, bricks and brick-making, lime and cement, iron and steel, timber, and various materials of minor importance in connexion with building. Like the other volumes, this section of "Notes on Building Construction" is eminently practical in form, and appears to have been got up with great care and with every desire to render it a reliable guide to the student.

The first chapter, dealing with stone, has been corrected and enlarged from the series of articles on "Stone Quarries" which appeared in our columns during the latter half of the year 1886, a circumstance freely acknowledged by the author. We shall not, of course, attempt to criticise any portions of the work derived from this source. But much of the other matter stands as it did in the first edition in 1879, and as a considerable advance has been made in our knowledge since that date, it would have increased the value of the work if certain portions had been re-written and the whole brought up to date.

After a few general observations showing the scope of this section of the book, the chief characteristics of building stone are pointed out. Under this heading durability, facility for working, hardness, strength, weight, appearance, position in quarry, seasoning, and the agents which destroy stones, are all briefly described; whilst the sub-section treating of durability is sub-divided, and, amongst other things, it deals with the physical structure of stone. The author admits that the physical structure of a stone is of the greatest importance in determining its durability, yet the matter is dismissed in a very few sentences. If the broad features of the structure of a typical granite, sandstone, and limestone were briefly described, they would serve to more vividly impress on the mind of the student the important *rôle* played in the preservation of stones by their structure in contradistinction to their chemical composition. The section following, which deals with the examination of stone, contains much excellent material, but it would have been better to have said nothing about Brard's test, as this was shown years ago to be of no practical value. On the other hand, a few observations on the use of the microscope in testing durability would have been very appropriate, in view of recent research.

Considerable space is then devoted to granites, syenitic granites, and other igneous rocks, and a table is drawn up giving the principal granite quarries in Great Britain and Ireland. These latter are not in all cases correctly described. For example, on a recent visit to Cornish quarries we failed to find Mill Hill, Madun, and were told that it should be New Mill, Madron; Penryn is not in Leicestershire, but in Cornwall; Birsmon, we believe, should be Birsemore; and Torres Forest, Kinton, is apparently intended for Tom's Forest, Kintore.

Slates, schists, and serpentine are next dealt with, after which the principal kinds of sandstone are described at some length, including their composition, colour, classification, uses, &c. An exhaustive table, showing the principal sandstone quarries, with remarks on the various stones, is appended. Limestones and marbles are similarly treated. These portions of the work are written in a masterly style, and we question whether such a mass of information of the kind has ever been brought together before, in such a limited space. A few artificial stones next find a place, followed by a concise account of the different methods adopted in preserving stone. The first chapter is concluded with tables giving the resistance to crushing, tensile strength, absorption of water, and weight of many kinds of stone. But these tables are not so useful as they at first sight appear, for they are not sufficiently explicit in stating the exact kind of stone referred to in the results of the experiments. It would not have been very difficult to be more precise on this point. For instance, in the table of the resistance of the stones to crushing, it is of very little use to give the strength of Aberdeen, Cornish, and Irish granite; York paving and quartz rock sandstones; and compact Portland, Chilmark, &c., limestones, unless the quarry from which each kind has come is also mentioned in the case of the granites, and not only the quarry, but the horizon in it from which the specimens experimented upon were taken in the case of the sandstones and limestones.

The next section of the book treats of bricks, tiles, terra-cotta, and the various other materials of which clay forms the principal constituent. It commences with a concise and clear description of the different kinds of brick-earths, and shows the effect upon them of the presence of foreign substances—other than silica and alumina,—in different proportions. The injurious effect of soluble silica combined with lime is noted, but no information is given as to any practical way of ascertaining its presence; and it is very rightly pointed out that the chemical analyses of brick-earths would be far more useful if the amount of free silica were given, as distinguished from that which is in chemical combination with other substances. The operations of the brick-maker are then referred to, and the method of forming clamps and kilns, but we are rather surprised to find that there is no description of any one typical brick-moulding machine.

It is stated that bricks should always be laid with the frog uppermost, but we do not agree with this in the case of over-sailing courses, as if the bricks are laid with the frog downwards in such positions, the effect of a throat is obtained, and the water will be prevented from running down the work. A good diagram is given of the Hoffman kiln, which is the adaptation to brick-making purposes of the Siemens regenerative furnace. As regards the prices of the various descriptions of bricks, we really think they would have been better omitted, as one season is no criterion for another, and, as a matter of fact, on comparing the prices given in the present edition with those in the former one, we find that in the majority of cases they are less than half. With reference to rubbers, we quite agree that they are not nearly so durable as the purpose-made moulded bricks, but the great difficulty with the latter is that it is almost impossible to get the joints and arrises quite true; in fact, they have the same drawbacks, in a minor degree, as terra-cotta.

A table is given of the total absorption of water by different kinds of bricks, but this is really not half so important as the rate of absorption, because bricks in ordinary situa-

* "Notes on Building Construction," arranged to meet the requirements of the syllabus of the Science and Art Department of the Committee of Council on Education. Part III. Materials (Advanced Course and Course for Honours). Second edition; revised and enlarged. London: Rivingtons. 1889.

ions are not exposed to constant but only to ntermittent wetting, and, *cæteris paribus*, those bricks which take up moisture most slowly are the best for building purposes.

With reference to the strength of brick piers, we notice that the short table given in the previous edition has been omitted, and some tests by Mr. Kirkaldy substituted; but it is a pity that the authors have not consulted some of the recently-published notes of such tests that have been made in the United States by Colonel Gillmore and others. These give a far higher compressive strength for brick piers than is given by Mr. Kirkaldy; and, moreover, we hold strongly the opinion that in a work of this kind it is worth while to give minute details of the tests,—the mere statement that at so many tons "failure began," and at so many "crushing took place," is not sufficient. There is a curious little piece of carelessness on the page where these tests are given, as a note alluding to Hurst's "Handbook" remains, whereas the remarks in the text to which the note refers are omitted. We must also complain of the inadequacy of the references given. It is simply annoying to be referred in a note to Page's "Economic Geology," or to Latham's "Sanitary Engineering," without chapter, page, or anything by which the reference can be verified. The same thing occurred in the previous edition, and the omission might have been very easily rectified.

Firebricks and terra-cotta are next dealt with, and a reference is made to the new fireproof material now so largely used in America,—porous terra-cotta, a mixture of clay and sawdust, or some such material, which, when baked, is consumed, leaving the terra-cotta very light, strong, and porous. The section concludes with a fairly complete account of drain pipes and roofing tiles.

The third chapter,—on limes, cements, concretes, &c.,—has been revised more thoroughly than any other portion of the book, and it now gives a most valuable mass of information on these materials. The constituents of limestone are described, and those which tend to give hydraulic properties are clearly defined, and the various kinds of limes resulting from the calcination of the stone, with their properties, are minutely dealt with. We think the authors might have gone further than they have done in condemning the use of fat lime for mortar. They say that mortar made with it never sets except to the extent of a thin surface crust, and that it attains no strength under any circumstances, with which we entirely agree; but they only say it is unsuitable for making mortar, "except for the walls of outhouses and for other similar positions"; what the other outdoor positions are for which fat-lime mortar is suitable we cannot imagine. An admirable account of the natural and artificial cements is given, and it would be difficult to find in a more concise form all the material matters connected with the manufacture of Portland cement, its properties, and the results on its ultimate strength of fineness, weight, &c. A most useful little table is given of the gauge of wires required for sieves for testing fineness, as it is very truly observed that, although the number of meshes to the square inch is frequently specified, the size of the wire is often not referred to, and yet the orifice of the mesh depends upon this.

Several other tables showing the results of various experiments are given for the first time in this edition, among which we may mention one taken from the "Proceedings" of the Institution of Civil Engineers, comparing the *adhesive* with the *cohesive* strength of Portland cement. The difference between the two is material: the cohesive strength is the strength with which the particles of a substance cohere with one another; the adhesive strength is that with which they adhere to other substances. The experiments quoted show that the adhesive strength of Portland cement is greatly increased by extreme fineness of grinding. After all, however, any test of neat cement under exceptional conditions is of much less value than a test of the material when combined with sand, and used under circumstances as nearly as possible similar to those which occur in actual work, and we are glad to find a table showing the effect of various proportions of sand and of various degrees of fineness in the cement, and the results again go to show that fineness of grinding adds to the strength when combined with sand, although the opposite was the case when it was used neat.

The account of mortars and concretes remains much as it was in the previous editions, and it practically gives all the information needed. A short notice of the use of sugar is added, and it is stated that experiments have proved that the strength of Dyckerhoff's Portland cement was considerably increased after three months by the addition of from ¼th to 2 per cent. of pure sugar, but that more than 2 per cent. of sugar made the cement useless. In the remarks on concrete, the desirability of having as few voids as possible is very rightly insisted upon, and the method of actually ascertaining the cubical contents of the voids in a certain amount of any aggregate is clearly shown. We have very little doubt that the French method of mixing mortar first and then combining the aggregate with it makes the best concrete. With reference to the compressive strength of mortar and concrete, we must again express our regret that the results of some of Colonel Gillmore's experiments are not given.

A description of various kinds of mortar and concrete mixing machines is followed by copious notes on the action of foreign constituents in limestones and cements, and very full practical directions for making chemical analyses are given. We have next a description of the various plasters used in internal work, such as plaster of Paris, Keene's and Parian cements, and their uses, as well as the materials used in ordinary plastering, and their proper composition. Selenitic plaster, stucco, artificial marbles, papier mâché and fibrous plaster, whitewash and distemper, and the different sorts of asphalte in ordinary use, are referred to, and this most useful chapter concludes with a table giving the quantity of materials required for the various plasterer's operations, and the approximate weight of limes and cements.

The next chapter, comprising a hundred and twenty-one pages, treats of the various metals, and by far the largest portion, as might be expected, is devoted to iron. This metal now enters so largely into the construction of all buildings of any size that an accurate knowledge of its nature and uses is most essential for a student, and we think he will find here nearly all the information which he requires. The different kinds of ores are described, and the process of smelting and the effects upon the metal of using the hot or the cold blast in the furnace are compared. The characteristics of the material known as cast iron, wrought iron, and steel are discussed very thoroughly, and it is most properly observed that, with regard to the two last-named, they merge so imperceptibly into one another that it is extremely difficult to define accurately where steel begins and wrought iron ends. It depends entirely upon a minute difference in the percentage of carbon, and we feel confident that if many of the rolled joists which are called steel by the manufacturers were carefully analysed they would be found to contain less than ·5 per cent. of carbon, which, according to Dr. Percy, is the limit at which iron may be regarded as steel. When it contains 2 per cent. of carbon or more it enters into the condition known as cast iron. The difference between the two kinds of cast iron, grey and white, is noted, as also the fact that these different forms depend upon the presence of carbon in intimate chemical combination, as in the white variety, or in a free state, as in the grey; but it is scarcely strictly accurate to say that grey cast iron can be converted into granular white cast iron by melting and suddenly cooling it, as it is only the outer skin, and not the inner core, which is thus affected. We do not think the authors have been quite so clear as they might have been in pointing out the defects of cast iron for constructional purposes, as there can be little doubt that even for columns when considerable length is required, in which case there is a liability to failure from bending, wrought iron is largely superseding cast. Wrought iron is very fully dealt with, and the different ways of testing its quality are described; but we cannot help regretting that in the tables which are given no notice is taken of the very interesting series of experiments made by Commander Beardslee, of the United States Navy, or of the more recent tests at the Watertown Arsenal. Steel is treated in the same exhaustive manner, and its various forms and characteristics are fully explained. One of the most useful portions of this chapter is that treating of the working stresses and the limit of elasticity of iron and steel, and we should have been glad if the authors could have incorporated here some of the more recent results obtained by Professor Bauschinger. The other metals described are copper, lead, zinc, tin, and their various alloys, such as brass, bronze, bell-metal, pewter, solder, &c. Practically all the information required by a student on these materials is given, and the chapter concludes with some most useful tables of weights, resistances, &c.

Timber is the next subject which claims the attention of the reader; the processes of growth of the exogenous trees are clearly described, the characteristics and defects of timber are pointed out, and the practical differences between the soft and the hard woods. The various forms in which timber comes to market are noted, such as balks, planks, deals, battens, &c., and the different appearances which distinguish Norwegian, Swedish, Russian, and American, while the purposes for which each kind is adapted are succinctly stated. In the description of elm and its uses, we notice that nothing is said as to its suitability for stable-fittings. We are rather surprised at this omission, as we believe no better wood exists for lining loose boxes or stall divisions, or for mangers where iron is not used. This is in consequence, not only of its hardness and toughness, but of its peculiar flavour, which prevents horses gnawing it to anything like the extent they do deal. A large number of the marks and brands upon timber are enumerated, and, in the absence of marks, the particular points to which attention should be directed in selecting it are clearly described. The various methods of seasoning timber, the symptoms of decay, and the means which have been adopted for preserving it, are detailed. Tables showing the weight, strength, &c., of timber are given; but these are all old, and we must repeat that we much wish that the more recent experiments of Mr. Lanza and others in America had been consulted. Nearly all the information in this chapter is taken from the works of Tredgold, Hurst, Laslett, and other standard writers.

The chapter on paints and varnishes is carefully compiled; a description is given of the various bases, vehicles, driers, colouring matters, &c., and of the way to distinguish good from bad. The numerous patent paints introduced of recent years are nearly all alluded to, and their various properties pointed out. The different gums which form the ingredients of varnishes are mentioned, and some useful recipes are given for varnishes, stains, &c., and also for washes for removing paint.

The different kinds of glass are described, and the weight, thickness, and size of sheets are tabulated. The method of printing wall-papers is discussed, and a very useful test for the presence of arsenic in them is fully given, and the book concludes with the description of a number of nondescript materials, such as glue, size, putty, nails, screws, &c. A short note is added on the physical properties of materials and their resistance to stresses and strains.

We consider this volume the most useful of the three which have as yet been published, and the value to the student of such a work of reference is incalculable. The task which the authors set themselves was a gigantic

one, and they have, on the whole, acquitted themselves of it admirably. We should have been glad to conclude our remarks here, but there is one matter in connexion with this new edition of which we must seriously complain. There are a large number of cross references in the text and in notes to other pages of the volume, and the errors in these references are so numerous as to be quite inexcusable. We counted more than fifteen in the chapter on metals alone. This is really a serious matter for the student, as he will waste much time in endeavouring to verify the reference, and it is simply the result of gross carelessness, for, on investigation, it turns out that in almost every instance the numbers refer to the pagination of the previous edition, which does not agree with that of the new one. We hope that this blunder will be rectified as soon as possible.

NOTES.

THE Report of Major Marindin, pursuant to the long sitting to hear applications from various companies for concessions to undertake the lighting of different districts of London by electricity, is so important in its bearing on the future lighting of London, and as being the first step towards what will eventually be such an immense undertaking when contemplated *en masse*, that we prefer to take time for fuller consideration of the subject before dealing with it at all in detail. The general conclusions or summary of Major Marindin's report are already made known to the public, but his recommendations as representing the Board of Trade have now to be considered, and the degree and manner in which they can be acted upon determined, by the London County Council. In the principle advocated by Major Marindin, of not allowing concessions to more than two companies over the same area, we are disposed to concur. Competition is a valuable influence, no doubt, in reducing cost to the public and inducing efficient service on the part of the companies; but it would be bought too dearly if we were to add, further than can possibly be avoided, to the number of agencies which can already claim rights to open and interfere with the streets. Between water, gas, underground telegraph wires, and pavement and sewerage repairs, we are troubled enough now in this respect, and the inclusion of several rival electric lighting and power companies would be a formidable addition to the present complications, though the requirements of electric lighting companies would not make such demands on space or depth of excavation as water and drainage. Major Marindin's recommendation that the mere objection of the local authorities in an area should not suffice to exclude a company from that area, unless the authorities themselves express the intention of providing for electric lighting, is well judged. It would never do for a conservative Vestry to have the power, merely because its members disliked electric lighting or had vested interests that were threatened by it, to deprive the residents within the area of the use of electric light. In this and other respects Major Marindin's recommendations appear to be framed with a due regard to the advantage of the greatest number.

THE Executive Committee of the Railway and Canal Traders' Association are impressing upon their members the necessity of closely watching the proceedings which will now shortly commence before the Board of Trade in reference to the objections which are being lodged against the new maximum rates, and also warning them against relying upon the statements made by railway officials as to their intentions with regard to the existing rates. The case is presented in a somewhat peculiar manner, the meaning of "maximum rates" being rather confused and obscured. "It should be borne in mind," we read, "that it is with the proposals of the companies as they are framed, and not with their managers' intentions, that traders have to deal; and further, that any assurance from the companies as to existing rates would be worthless, as the Act of Parliament which in every case must be passed to confirm the Companies' proposals will override all private agreements and undertakings relating to rates." This seems equivalent to saying that the Act will not only authorise certain maximum rates, but will also compel the railway companies to charge them. At the last half-yearly meeting of the Midland Company, the Chairman told the shareholders that the Act was not intended to regulate the rates actually charged in practice, except as providing a maximum which was not to be exceeded. Now, without placing blind confidence in official assurances, this may surely be accepted as a correct view of the design of the new legislation; and, while it is essential that the maximum should be moderate and reasonable, it is desirable that traders should recognise that for the railway companies to be pinned down to too low a figure would not, in the long run, be beneficial to the community. It is clear that a little latitude may be really essential to the profitable working of railways, and it is obviously not their policy, whether they have given assurances or not, to charge "limit" rates directly a maximum is fixed. The price of coal is one thing which, to our mind, gives force to this argument. The railway companies are very large consumers of coal, and we learn from the *Colliery Guardian* that an increase has taken place in the price charged to railway companies for steam-coal of no less than 33 per cent. on the rate contracted for last year. It is not at all likely that such an advance will be maintained, but these things naturally suggest the possibility of great disturbances in prices, which would force up the value of labour and of nearly all commodities, and it would be hard upon railway shareholders if the carrying industry alone were to remain tied down to unproductive rates. Of course the amount of latitude to be given is a question to be carefully considered both by the Board of Trade and Parliament, and we quite agree with the Railway and Canal Traders' Association that this stage of the proceedings should be closely watched.

THE proposal which has been made to build the new National Portrait Gallery on the vacant land in the rear of the National Gallery, thereby for ever preventing the possibility of extending the National Gallery, is as ill-advised as if Mr. Shaw-Lefevre had been at the bottom of it. But the alternative supported in the *Times* of Monday, to place it as an annexe to Kensington Palace, is just as absurd in another sense. It would interfere with nothing there, certainly, and no one would interfere with it, for it would be so far out of everyone's way that no one would take the trouble to get to it. Besides, the site would be directly in contravention of the conditions under which the gift was made, and the evident object of which was to prevent the pictures being taken off to Kensington. It is to be hoped the anonymous donor will have some voice, at all events in the way of a *veto*, in the selection of the site, or the Government will be pretty sure to nullify the value of his gift by some blunder in their manner of applying the funds thus generously placed at their disposal.

IN the last issue of the *Ἐφήμερις Ἀρχαιολογική* (iii., 1 and 2) two plates are devoted to the publication of the frescoes recently discovered at Eleusis. The paintings, it will be remembered, were found in a building, apparently a dwelling-house, near the greater Propylæa. The discoverer, Mr. Philios, considers that the greater Propylæa were a Roman imitation of the Athenian Propylæa, and dates both them and the adjacent house, with its paintings, as of the time of Hadrian. Wall-paintings in Greece are so rare that, though the remains are small, they are of great value. The best-preserved fragment is a figure of Zeus seated,—we say "seated" by courtesy, for the god is in a sitting posture, and there is an elaborate chair, but so faulty is the perspective that he is sitting on nothing but air; he holds a roughly-drawn Nike in his hands, and his feet rest,—all the support he has,—on a stool; the left hand holds a sceptre, and the whole conception is distinctly borrowed from the Olympian Zeus. This picture, like the others, is enclosed by lines, and is essentially a panel picture. On the panel, right and left, are painted respectively two bulls and two pigs. We are reminded that the ancient name of the painter was *ζώγραφος*. The colours employed are still very vivid,—purple, brown, yellow, two shades of red and emerald green, are all well preserved. One of the plates gives a general view of the two walls, the other an enlargement of the Zeus and animal panels.

A BUST of Augustus, of great value, was found during the excavations for the construction of a drain near the site of the Golden House of Nero. The bust will be added to the collection of busts of the Roman emperors and empresses, arranged in chronological order around the room called the Hall of the Emperors, in the Museum of the Capitol.

THE Roman Municipality is at present thinking of forming a new Mediæval museum or collection of coats-of-arms, in the Palace of the Counts Degli Anguillara (a branch of the Orsini family), at the extremity of the modern "Ponte Garibaldi." The palace, built in the fourteenth century, still retains a pretty lodge, the tower of fine brickwork, the Guelph windows, and the door with the coat-of-arms of the Anguillara family. Certainly this new institution will be interesting in regard to the Mediæval history of Rome and Roman families.

DR. WALDSTEIN has lost no time in "publishing" the newly-discovered head of Iris, which he was so fortunate as to be the first to identify. The discovery of this head may indeed be considered, as he says, the "crowning event in a series of fortunate finds." It is to appear in the next number of the *American Journal of Archæology*, of which a preprint has just reached us. The head, it will be remembered, was found just where the careful masonry of the wall of Cimon joins with the wall of nondescript character which is just now in process of being levelled. This wall, which has usually been considered barbarian work, Dr. Waldstein holds to be, in all probability, Byzantine. He further believes that this same wall may contain fragments of the central figures of the east pediment, which were not extant when Carrey made his drawing in 1674. We can only hope that his prophecy may speedily be fulfilled. The head of the youthful Iris is of great beauty, but as a cast may now be seen in its right place in the British Museum it need not be described in detail. It is interesting to note that the head is turned to the left, not to the right, as in the restoration of Stuart. The motive is thereby made more appropriate, as Iris watches the approaching procession.

IN making the foundations of embankment-walls along the River Tiber, in the Prati di Castello, near the iron bridge of Ripetta, two statues of Greek marble were found last week, of which the one represents the goddess Pudicitia, and the other Venus. This second statue is a good imitation of the celebrated statue of the Venus of the Capitol. The statues have been removed to the new National Museum at the Thermæ of Diocletian.

ACCORDING to *L'Architecture*, M. Lasteyrie has been making some painful disclosures in the pages of the *Ami des Monuments*, the organ of the Paris Society for the Protection of Ancient Buildings, in regard to the extent to which restoration of ancient buildings and sculpture has been carried in

some parts of France. Among other things M. Lasteyrie avers that not long since a distinguished archæologist, in a treatise on French sculpture in the thirteenth century, had instanced as examples, and even had illustrated by photogravure, a group of figures from the portal of Notre Dame at Paris, which were in reality reproduced by modern carvers under the direction of Viollet-le-Duc, thirty years ago: a typical example of the confusion of artistic history which may result from wholesale and "learned" restoration.

MR. SHAW LEFEVRE'S Westminster Abbey Bill, as our readers may have noticed, has been withdrawn in consideration of the probability that the Government will institute an independent inquiry into the subject of Westminster Abbey burials and monuments. It is to be hoped this does not mean a repetition of the absurdities which characterised the Westminster Hall Committee, and that the Government will endeavour to find a chairman and a Committee who know a little about architecture.

MR. JUSTICE NORTH (Chancery Division of the High Court) has sanctioned an order for applying the purchase-moneys paid by the Metropolitan and District Railways to the building of a new Weigh-house Chapel. The trustees have arranged to lease from the Duke of Westminster, for a term of ninety-nine years, at a peppercorn rent, a site in Duke-street, Grosvenor-square. Messrs. Shilletoe & Son, of Bury St. Edmunds, builders, have given a tender, amounting to nearly 25,000*l.*, to build a chapel and parsonage-house, together with schools, &c., after the designs of Mr. Alfred Waterhouse, R.A. The first Weigh-house Chapel was constructed over the King's Weigh-house in Love-lane. Eastcheap, *circa* 1697, for an Independent congregation, under the ministry of Thomas Reynolds. That community represented a following of the Reverend Samuel Slater, who on the passing of the Act of Uniformity had relinquished, in 1662, his cure at St. Katharine's-by-the-Tower. In 1834 was laid the foundation of a more commodious chapel on the western side of Fish-street-hill, to receive the larger flock of the famous preacher, Thomas Binney, in whose memory an organ and a window were subsequently set up. On Wednesday evening, March 28, 1883, a valedictory meeting, under the late Mr. Samuel Morley's presidency, was held in this chapel. The fabric was shortly afterwards demolished for the purpose of completing the Inner Circle Railway line. Its site is now covered by Monument Station booking-office. The Weigh-house, in Weigh-house-yard, East Cheap,—standing on the site of St. Andrew Hubbert, or Hubbard, Church,—belonged to the Grocers' Company, to whom, as being then dealers in wool, and to the City, Richard II., in 1383, had granted custody of the "King's Beam" on Wool Wharf. In later years the Grocers kept the "beam" at the Cornet's Tower, by Bucklersbury, used by Edward III. for his exchequer, then at Cornhill, whence it was removed to East Cheap. The labourers here were known by the style of "tackle," as distinguished from "ticket," porters.

DR. PAGE'S Report to the Local Government Board* (March 15) on the prevalence of enteric fever at Spennymoor (County of Durham) notes serious defects of ventilation in the drainage of the district. "The upper portion of the main sewer was unventilated, and the only houses invaded in this locality, two in number, were among the few having direct communication with this unventilated section. Considerable pains had evidently been bestowed upon details of house drainage in each instance, as to severance of waste-pipes from the outside drains, but each had served, by means of its soil-pipe from an indoor water-closet, to ventilate the public sewer upon the premises .... But it is more especially in association with prevalent excremental nuisances throughout the district that enteric fever in Spennymoor and Tudhoe Grange has occurred. The midden privy is in general use, and accumulations of filth and refuse were met with close to dwellings under conditions which could not fail to be injurious to health." Dr. Ballard's interim report (same date) to the Local Government Board on an inquiry at Middlesbrough and its neighbourhood, as to an epidemic of so-called "pneumonia," but which was in fact a specific "pleuro-pneumonic fever," records the prevalent opinion in the district that it was due to the inhalation of fine dust proceeding from a new industry established at the North-Eastern Steel Works, namely, the pulverisation and sifting of the basic slag resulting from the manufacture of steel by the Gilchrist-Thomas process; and some of the medical men in Middlesbrough were inclined to entertain this notion. Dr. Ballard, who here deals mostly with purely medical rather than sanitary analysis, adopts the conclusion that exposure to "slag dust" was obviously not the primary cause of the malady. "But among assisting causes of attack by the specific disease may be mentioned exposure to the inhalation of this *and other* kinds of trade-dust, and also exposure to chills or unusual bodily fatigue."

* Eyre & Spottiswoode, London; A. & C. Black, Edinburgh; Hodges, Figgis & Co., Dublin.

WE regret to find that Mr. F. Edwards, whose important work in the improvement of grates is known to many of our readers, is under the necessity of appealing for charitable aid. We have received a circular or memorial calling attention to the facts of Mr. Edwards's case and asking for assistance from the public. We should suggest that Mr. Edwards's friends—who have, if we remember right, previously made similar appeals on his behalf—would take a wiser course if they used influence to get Mr. Edwards's case represented to Government as one with a reasonable claim for a pension. Mr. Edwards showed in earlier life much energy and talent in the branch of study and manufacture to which he devoted himself, and was the author of improvements in grates which are of public value; he appears to have met with commercial reverses mainly brought about through special adverse circumstances; and it appears to be a case in which the relief of a pension from Government might very well and suitably be bestowed.

A SMALL exhibition of American Decorative work, and of etchings by the Society of American Etchers, has been on view at the rooms of Messrs. Johnston Norman & Co., in New Bond-street. The collection of etchings includes some fine work. The etchings entitled "An Old Song" by Mr. W. Sartain (after a picture by Mr. Percy Moran), and "John Alden's Letter" by Mr. C. Y. Turner, are examples of highly-elaborated work in pure line, and very fine work of their class. Among the less elaborated works, showing those broad contrasts of light and dark in which to our thinking the special power of etching consists, a particularly fine example is Mr. Carleton T. Chapman's "White Wings," a study of ships and their white sails reflected in the sea, which is full of light, and in which much is told in a few strokes, the water especially being exceedingly well treated. Among smaller etchings of the same class Mr. Parrish's "A Gale at Fécamp" and Mr. Platt's "An Atlantic Dock" may be mentioned. The "Low Tiles," decorative tiles with subjects in very low relief and with a high glaze, by Messrs. J. G. and J. F. Low, are very effective as decorative material, with fine tones of colour. Some of the large tapestry subjects executed by "the Associated Artists," as portières or screens, are finely designed and decorative in effect: two embroidered curtains by Mrs. Wheeler are especially good, one called "Fleurs-de-lis," not representing the conventional form so-called, but a fine free study of leaves and flowers of lilies, and one called "Roses in Net," which represents heaps of roses apparently suspended in nets of gold thread which is worked over the surface; a little too realistic, perhaps, but certainly bright and striking in effect.

WE have frequently called attention to the improper offers of commissions which are often made to architects by patentees and manufacturers anxious to get their inventions introduced into specifications. The "Acme Wood Flooring Company" seems to have hit on a more ingenious and refined method for enlisting the commercial interests of architects in the employment of their patent. They endeavour to work on the feelings of the architect by issuing a circular setting forth the advantages of the Acme Wood Flooring system, accompanied by a letter stating that "the Directors for obvious reasons would prefer to allot the bulk of the Company's shares to members of your profession," adding that "the very profitable nature of the business will be at once apparent to you." Thus the architect to whom shares are allotted will experience the serene satisfaction arising from a consciousness that he is feathering his own nest every time he writes in a specification—"All floors to be laid with the Acme Wood Flooring Company's Immovable Acme Solid Wood-Block Flooring." This is certainly a more artistic method than the gross offer of a commission. The "for obvious reasons" is delightful.

ARCHITECTURE AT THE ROYAL ACADEMY. IV.

1849. "St. John the Baptist Church, Wimbledon; design for completion, with tower and spire": Mr. T. G. Jackson. A drawing in brown ink and lightly tinted in brown, showing a portion of the church and a fine massive-looking tower in late Decorated style, exceedingly plain in the lower portion, and with wall-mullions and two long windows on each face in the upper portion, with crocketted canopies running up into the battlemented parapet of the tower. The south-east angle of the tower is accentuated by an octagon stair turret. A short slated spire grows from the top; one does not feel sure whether the tower would not look better without this addition. The method of tacking on a clock-face on one side of the tower and half-covering two of the small openings in the lower part, as if it had been forgotten and put on afterwards where it could, strikes us as more whimsical than architectural. As a pendant to this drawing, in the corresponding position at the other side of the wall, is hung No. 1878, by the same architect; "Zara, Dalmatia; the campanile of the Cathedral as it is proposed to complete it.' This drawing, a lithograph of which will be found in the present number, we erroneously alluded to in our first article on the architectural room as a view of the campanile at Zara; it appears however that the campanile was never completed, and it is proposed to complete it now from the design of Mr. Jackson, who we may safely say is the first English architect who has ever been called on to complete an ancient church in Dalmatia. The drawing is a clear well-executed water-colour, having however a rather "monochrome" effect at first sight from the mass of brown in the building, which might have been treated with a little more licence as to colour with advantage to the pictorial effect. The illustration will show how the architect has adopted the Romanesque style of the existing portions of the church. The little bits of decorative inlay here and there on the tower have a pretty and piquant effect.

1852, "Side of Billiard-room": and 1879, "Ceiling of Billiard-room": Mr. G. Aitchison, A.R.A. These two, which represent the decorative scheme for one apartment, must be taken together, and ought to have been hung together. The wall decoration shows a massive and richly-decorated oak wainscot to two-thirds the height of the room: the lower portion in plain panelling, the upper with richly-carved panels and frieze, with profile heads in bas-relief in the centre portions, in medallions with a gold ground; pilasters with masks and terminal figures divide the work into bays. There is a large and heavy cornice which ranges with the cornice of the mantelpiece in the centre, and over this a kind of attic with further carved pilasters and frieze; the upper face of the cornice forms a shelf for the display of antique glass, &c., the effect of which is very well rendered in the drawing. The mantel has carved columns of Renaissance type, with an overmantel raised above the main line of the wainscot, with

colonnettes and niches holding glass and ceramic objects. The wall-paper above is of a semi-realistic foliage design, gold on buff, each repeat being, so to speak, right-handed, not radiating from a centre, so that the eye is rather carried along from left to right; the repeats are carefully arranged so as not to synchronise with the divisions of the wainscot. A medallion cornice with a good deal of gilding separates this composition from the ceiling, which is nearly white, with only a little delicate tinting; it is divided out by broad ribs into panels which are filled with foliage design. The combined effect of wall and ceiling ought to be very rich and effective, and the ceiling is treated in such a way as to harmonise with the rich and massive treatment of the wall without heaviness in colour and consequent loss of light.

1854. "Design for Country Mansion": Mr. T. Locke Worthington. A picturesque design for a house with mullioned windows and little decoration; the plan has two projecting wings in front, with a recessed portion between, the wings being connected on the ground-floor level by a low story building forming a terrace walk over, with steps rising through the centre of it for access from the outer door to the door leading into the hall. This effect of ascending through a stair-well in the terrace is not very good; it is a kind of planning of the entrance only suited to a house on a much larger scale and where there is more space than shown here.

1861. "House, Palace Court": Mr. Leonard Stokes. A charming pen-and-ink drawing bearing the signature of Mr. C. E. Mallows, in a style admirably adapted to give to this old-fashioned looking house the desired antique effect, and persuade the spectator that it is a house about a century old, and not, as it probably is, a perfectly new one. The house is eminently home-like in appearance, and the projecting bay on the first-floor, with its row of low windows with small panes, is an agreable feature externally and probably assists to make a very pleasant room internally; but if the house were shown in a plainly-drawn elevation and plan, there would really be very little to call architectural design in it; and it is a great question whether it would have been hung at all if presented in that form. It is obviously hung for the drawing; but this raises the question we have suggested before,—Is the Architectural Room intended to illustrate drawing or to illustrate architecture? And if a drawing is hung solely for the sake of picturesque drawing, ought not the draughtsman's name to be given in the catalogue, when it is really his work that is hung and not the architect's? How many of the drawings in this room are the work of those whose name they bear? Of course in the present case it is well known that the architect whose name is appended is perfectly competent to draw for himself; but we know also that there are many cases in which the person whose name is attached to the work in the catalogue could not have made the drawing himself if his life had depended on it, and it may be doubted whether in some cases even the design, as well as the drawing, is not the work of another person than the one named in the catalogue. Thus a great portion of the Architectural Room is a kind of respectably got-up sham; we do not know whose work we are really looking at. It would have a very wholesome effect if the Academy would try just for one year the experiment of announcing that drawings would be catalogued in the name of the person who executed them. The result might be amusing and instructive. The titles could be given in this kind of way:—"Church to be built by Mr. Fyve Persent .... A. Lightpen." Then we should get at the facts of artistic ownership. The reflection is only *apropos* of drawing No. 1861 so far as this, that it is an instance of a building of very meagre architectural interest hung simply for effective drawing. Now, we have seen drawings of buildings of much more architectural interest than this, and quite adequately drawn, which have been refused from this year's Academy. In other words, drawing counts first, architecture is only of secondary importance: and this is a wrong principle. From which not altogether uncalled-for digression we will proceed to

1865. "New Theatre, Cambridge Circus": Mr. T. C. Collcutt. This is rather an innovation in theatre fronts: that is to say, it is a building of which it would be popularly said that it does not look like a theatre, not having the columns or pilasters and "classic" gimcracks which are usually found to characterise a theatre design. The drawing, a pen perspective, shows the face towards the Circus, which takes the curve of the Circus frontage. The building has a solid bastion-like basement rounded off at the angles, and with a large octagonal turret partially corbelled out, at each extremity of the front, with a rounded cupola termination rising above the cornice line; smaller corbelled-out turrets break the line of front in the centre portion, and beneath the space included between these are the arches which give access in the basement to the main entry. The general composition is that of horizontal ranges of windows, arcades, &c., stopped by the two large angle turrets, and the general effect is both rich and monumental looking, the solid basement especially giving the building a look of monumental massiveness not generally characteristic of theatre designs. But it was a great mistake to put a visible gable termination to a front with a curved line of plan. Nothing can make these crippled lines of the gable look well; it should have been masked behind a screen or façade. No plan of the theatre is given. From its height above the ground we presume this theatre is not built on the now generally favourite system of having half the auditorium below the ground.

1867. "Cottage Block for S.W. Railway at Bishopstoke": Mr. Ralph Nevill. Hung very high, but noticeable as an attempt to make railway *employés'* cottage blocks picturesque; an attempt very seldom made, railway companies being generally content with a long brick wall with holes in it for housing their workmen. That something better is done in this case is creditable to the Company as well as to the architect.

1869. "Design for a Church": Mr. W. H. Bidlake. We have already referred to the merits of this drawing, which is indeed a masterpiece of picturesque architectural drawing in pen-and-ink line, both for the delicacy and brilliancy with which the detail is indicated, and for the tone and breadth of effect obtained in the drawing as a whole. It has other merits than mere draughtsmanship, however; there is much power and picturesqueness in the design, which shows a view from the north-east of a church standing on broken ground sloping downwards to the eastern end. An octagonal apse with a very massive basement (evidently containing a crypt) is seen at the eastern end, and to the right of it a picturesque tower with large lucarned windows above, the whole lower part consisting of a piled-up mass of perfectly plain masonry. This rock-like mass of building gives the more effect to the rich treatment of the upper part of the apse adjoining, and of the nave further on. It is not very obvious how the octagon transept with its small window high up, projecting beyond the base of the tower, would be utilised internally, and it would have been better if the author had added a plan showing the basis of his composition, which we conclude is a purely imaginary one, but one which indicates a great deal of feeling for the picturesque element of architectural composition.

1870. "Folkton Manor House, Yorkshire": Mr. E. J. May. A very scratchy tinted drawing of a picturesque irregular rustic-looking house, the right-hand portion set on at an oblique angle, and a porch and bay, with gable over, cleverly got in at the angle. The lower half of the sheet is occupied by a large plan, showing that the irregularity of the line of plan has been made the occasion of some internal picturesqueness of nooks and angles in the hall, and practically the plan is well arranged. The author is to be commended not only for making plan an important feature in his drawing, but for also indicating the points of the compass on the plan, an important element in regard to the plan of a house which is generally entirely omitted in Academy drawings, even where a plan is given. On the other hand, while deprecating the hanging of drawings for mere draughtsmanship, we must say that this drawing, with its roughly scratched lines and green tufts of bushes (like the imitation trees in a Noah's ark toy), is too rough and careless to send for exhibition, and amounts to a kind of disrespect to the public.

1872. "A Fountain against the Wall of a Building": Mr. Arthur R. Jemmett. This looks like an École des Beaux Arts competition design: it shows a Classic composition, on a massive slightly-battering surbase, with coupled Ionic columns flanking the centre, and pilasters at the outer angles. Between the columns is a circular-headed alcove with two nude figures (in bronze?), one reclined and the other standing, water pours out from the rockwork beneath into the fountain basin below. Above is an attic with a centre pediment with caryatides at each side balancing the columns below. At the sides, between the pilasters and columns, are medallions with busts, and square-headed alcoves with bronze vases. On pedestals on the rim of the basin below are four draped figures holding lamp standards, these are well put in and have a graceful effect. The composition is made up entirely of familiar and commonplace elements, producing some effect from the manner in which they are grouped and drawn.

PICTURES AT THE PARIS SALON.

THE Salon of 1889 includes 2,271 pictures, about 300 less than last year; and, as before remarked, is held under great disadvantage this year from the more than rivalry of the great Exhibition. Comparing the modern collection with the retrospective exhibition of the Champ de Mars, one is led to the conclusion that French painting during the last two or three generations has not shown, in what the French call "La Grande Peinture" the same progress which has been shown in landscape and *genre*. After having, in the Palais du Beaux-Arts on the Champ de Mars, looked at the "Sacre de Napoleon" by Gérard, which has been exhumed from Versailles for the occasion, or the "Battle of Taillebourg" by Delacroix, and other important historical paintings there exhibited, one feels it a great descent to the large "Fédération" by M. Henri Martin which meets the eye in the vestibule of the Palais d'Industrie; an immense canvas of what may be called very loud colouring, the crudity of which is the more accented by the habit of this young painter of placing his colours in juxtaposition like a mosaic. The result is a *mélange* irritating to the eye, and out of which it is by no means easy to pick the motive of the composition.

The Sorbonne decorations include four pictures, of which the most important is that by M. Chartran, representing a scene from the siege of Metz in 1555, where Ambroise Paré, the celebrated surgeon of that day, is trying on an amputated limb his ligature for the arteries. The patient, with his back to the spectator, writhes in a spasm of pain; the surgeon is alone cool and collected amidst an excited and anxious group. The picture is finely drawn and composed, perhaps rather tame in colour, but it will probably look more effective in its intended position on the grand staircase in M. Nenot's building. The "Rollin" of M. Flameng, who represents him standing and conversing with some young priests in the court of the Collège de Beauvais, is not equal to his triptych of last year. The scene is painted in a prevalent heated tone of colour which will harmonise ill with that of the first painting in this decorative scheme. M. Lhermitte, who is commissioned to decorate the Hall of the Faculté des Sciences, has frankly accepted a subject in modern life as represented by a scene in which Claude Bernard is giving a lesson in vivisection amid a group of students and well-known savants—portraits, and very good ones. This painting, in a broad and grand style, like all M. Lhermitte's works, is not equal however to his paintings of out-door scenes. The same remark would apply to M. Lerolle's "Albert le Grand" at the Convent of St. Jacques, and which is also intended for the Sorbonne. The figure of the monk, in black and white robes, stands out rather hardly against the white walls of the cloister over which the outline of Notre Dame is seen; the figures generally seem rather stiff and destitute of life and movement.

Historical painting, thanks to M. Tattegrain, counts one very interesting example,—"Louis XIV. visiting the battle-field of Dunes eight days after the victory." This is a curious painting, disagreeably realistic in its representation of the carcases of the horses lacerated by the attacks of crows, and the decomposing bodies of men lying about in the sand, while the King, surrounded by a ragged crowd whom his Guards are keeping off, is smelling some wild flowers as an antidote to the less agreeable smells that abound. It is hardly equal perhaps to his "Magestas" of last year, but M. Tattegrain is an original thinker whose works, always differing in style and subject, are always of interest.

M. Jean Paul Laurens exhibits a painting to

which a good deal of archæological study has gone, of a scene in a Spanish convent, where some white-robed monks are making preparations for the amiable duties of the "Saint Office." M. Rochegrosse, who seems to enjoy painting scenes of "blood and thunder," merits thanks for having restricted himself to a smaller scale than usual in his representation of the Mediæval scene celebrated as the "Bal des Ardents," when Charles VI. was burned with his courtiers. It is a disagreeable piece of gaudy painting, looking rather like a Mediæval illuminated design magnified.

M. Urbain Bourgeois, with a ceiling intended for the Hôtel de Ville of Limoges, and M. Léon Glaize, with a large panel painted for the Mairie of the Twentieth Arrondissement, may be said to represent official allegorical painting. The first-named is the best of the two. M. Glaize's painting, supposed to represent "La Famille et le Travail," is a heavy ill-composed work, uninviting in colour, and not promising well for the result of the work which has been entrusted to him: another instance of failure as the result of the competitive system as applied to the decorative painting of public buildings.

A Positivist epoch with little fixed belief, like the present in France, can hardly produce a religious art capable, as in primitive times, of touching the heart, and M. Krug's painting of "Bienheureux J. B." only leaves the spectator indifferent, or asking himself by what miracle of equilibrium this black-robed ecclesiastic can be sustained so far above the ground. The triptych by M. Lehoux, intended for a basilica, is a mistake of a young artist spoiled by mere academical successes. It belongs to an exploded school, like the "Heliodorus" of M. François Lafon; while M. Pierre Lagarde, in his vision of "St. Jean de la Croix," continues to produce *pastiches* of the early Renaissance painters, mere imitations without the naïve charm of sincerity which belongs to the genuine works of this period.

Of all the religious pictures exhibited, those of M. Uhde alone perhaps, for some years past, have had a genuine attraction, because they present subjects of true human interest, in the illustration of events from Gospel history. For M. Uhde Christ is not the allegorical personage of the old masters, but a real being moving among troops of the poor and the humble who are painted from life. His triptych entitled "La Nuit Sainte" is a new departure in this class of painting, full of charming details, and the cherubs who sing the advent of the Messiah are real rosy children. Among the allegorical religious paintings however, we may mention two as of exceptional interest, the "Madonna" of M. Dagnan-Bouveret, and the "Vierge Noire" of M. Mercié, both beautifully modelled and fine and delicate in colour; but can these really be classed as religious paintings, and not rather as pretty fancies painted without any end beyond that of being pretty?

Perhaps the same reproach, in another sense, may be addressed to M. Falguière, who has unfortunately not been content to remain a great sculptor, but has also appeared as a very inferior painter, and it is difficult to believe that this ill-drawn figure of "Juno" can really be the work of the author of "Diane Chasseresse."

M. Carolus Duran, the most accepted and cleverest painter of fashionable elegance, who is at home in shot silks and velvet, and in all the ornaments of the feminine toilette, has had the odd fancy this year of turning right round into Pagan mythology. His "Triumph of Bacchus" can only be regarded as a momentary aberration on the part of a very gifted artist, who will probably return again to the marvellous portraits which have made his reputation, and leave mythology to M. Bouguereau. It cannot be denied, however, that M. Duran's special qualities are still visible in this new class of subject, and his frensied Bacchantes are at least full of life, while M. Bouguereau's retain always the same cold correctness of drawing and execution, and absence of sentiment. It is a perfection of mere execution which leaves no room for criticism, but unfortunately it is nothing more. M. Bouguereau is to living nature what M. Desgoffes is to still life.

M. Gerôme's picture is a curious affair: lions, lionesses, and tigers are gambolling in a cage, and in the midst of them is the plump figure of a rosy little cupid girt with a garland of roses; he leans on a gilt bow, a star shines on his forehead, and the animals stop their evolutions to gaze on this strange apparition. This puerile allegory is to signify that even the most savage natures succumb to the power of love! We take it the real fact was that M. Gerôme wished to paint some animals but did not wish to rank as an animal painter; hence the endeavour to convey an allegory into the work.

There is a great deal of cleverness in M. Gabriel Ferrier's "Bella Matribus Detestata," which is also in a sense allegorical; it exhibits women with their children flying from invaders; but its pathos is only melodramatic; in short, it is an "envoi de Rome," and that is all. Ordinary mortals, who are not well up in their mythology, do not make much out of M. Bukovac's "Aurore mourant dans les bras du Jour," and the "Diane" of Mdme. Cazin is not much nearer comprehension, any more than the nymphs of M. Lix and the Idyl called "Printemps" fashioned by M. Blanchard on the model of M. Bouguereau.

Battle pictures are not, comparatively speaking, very numerous this year. Among the number may be mentioned the "Death of General Marguerite at Sedan," an immense picture by M. Gardette; the battle of Frœschwiller, by M. Moreau de Tours, whose work has gained by his adoption of a more modest dimension of canvas; and a scene in the fight at Bazeilles, by M. Sergent. M. Marius Roy, whose battle scenes are generally good, has not made a success with his "Siège de Puebla." Among other scenes of violence or of combat, the assassination of the regicide bishop Audrein, by M. Hippolyte Berteaux, and the "Combat de Quiberon," by M. Outin, are two well-treated scenes; and M. le Blant's painting of peasants armed with old muskets and scythes, pressing around a priest who blesses their arms, tells the story with great spirit and is well grouped, though rather hard in execution.

The largest and this year the most important section of painting is that of *genre*, which is also the favourite section of work with the public. M. Bouveret's "Brétonnes au Pardon," though one of the most remarkable works in the Salon, by a young artist who has shown progress every year, can only be classed as a work of *genre*. It represents a group of peasant women seated on the grass, behind the village church, a very simple scene, painted with the greatest truth of observation. There is the same kind of charm of natural simplicity in the work by M. Roll, representing a group of two young women, a child, and a dog, reposing on sunlit grass on a bright summer day; a scene full of atmospheric effect and fine colour.

The "Jour des Funérailles" of M. Benjamin Constant is a very large picture, representing an Arabian scene in which the accessories play the most important part (if one may so express it). This brilliantly-gifted painter excels in the art of grouping arms, jewellery, Oriental textiles, &c., but all the interest of the picture is in these, and the personages, however well painted, as they undoubtedly are, have only the secondary place. This is too frequently the fault also of Clairin, who this year at least has restricted his brilliant effects of light and colour to the limits of a very small picture entitled "Intérieur d'Église à Florence."

M. Besnard's "Sirène" is a young woman with a pretty dimpled face standing on the shore of a rose-tinted lake; an eccentricity of colour which is more astonishing than charming in its effect. As a contrast to this pretentious fantasy take the "L'Homme est en Mer" of Mdme. Démont-Breton, representing the wife of a sailor waiting sadly at the fireplace, the red light from which illumines the child sleeping on her knees; a subject of genuine pathos treated by an artist who has devoted herself to scenes of homely family life. "Les Amoureux" of M. Binet is an idyll translated into modern life. As to the "L'Intimité" of M. Carrière, thanks to the gauze veil which this painter seems to suggest between his pictures and the spectator, there is nothing to be made out of the half-effaced composition. Mr. John Lewis Brown exhibits two charming little pictures, "Promenade de Chevaux" and "Waiting for the others." This latter is particularly good in the painting of the figures of the jockeys, whose costumes make bright spots of colour among the verdure of the landscape.

The "Bord de la Mer" of M. Duez is an agreeable composition, but inferior to his painting of a young woman clad in white whose figure is relieved against a thick mass of foliage which forms a kind of framework to it. Very pretty is Mr. Ridgway Knight's peasant girl watching her sheep in the sunset light. M. Gueldry and M. Roger Jourdain have contributed boating pictures (the latter a Thames scene at Maidenhead), rather gaudy scenes, looking the more so in comparison with the "Un Enterrement en Campine" of M. Verstraete, a work of great simplicity and soberness of colour.

M. Raffaelli's "Buveurs d'Absinthe," people in sordid costumes with visages emaciated by indulgence in the deleterious beverage, is horrible in its realism, which the talent of the painter partially excuses; an excuse which cannot be offered for the "Ouvrière Mourante" of M. Pelez. We may mention also, in the same quarter of the exhibition, the Horse Guards at Whitehall of M. Dumaresq, the small rustic figure of M. Albert Fournié, the pretty "Flirtage à bord de l'Eau" of M. Adrien Moreau, and the "Paysannes au lavoir" of M. Lhermitte, which however has hardly the solid qualities of some of his former works.

M. Blaize Desgoffes remains the most marvellous painter of still-life. Even Dutch patience has never surpassed in fidelity and in ocular illusion the work of this extraordinary artist, who every year parades before us extraordinary reproductions of the treasures of the Louvre. Here, in the midst of textiles of fairy-like delicacy of embroidery, is a Limoges vase, a rock-crystal cup, jewellery, china plaques, and what not; indeed M. Desgoffes is a lapidary or jeweller rather than a painter. But what a contrast between this laboured and minute work, and the mastery with which M. Vollon paints plain copper and stoneware vessels with the warm colour which the light of day gives them. Among the still-life subjects are also to be noticed the partridges by M. Bergeret, the poultry of MM. Claude and Dominique Rosier, the fish of Mdme. Muraton, grapes by M. Thurner, M. Jeannin's hollyhocks, M. Bourgogne's chrysanthemums, and the magnificent "Étalage de Fleurs" by M. Grivolas, a southern artist whose palette reflects the warm tones and bright sunshine of Provence.

Landscape is the branch of art most flourishing in France at the present day, and presenting most originality, modern painters of this latter part of the century discovering a poetry and a meaning in nature which their predecessors had not a glimpse of. Accordingly the old school, represented by MM. Benouville, Curzon, Paul Flandrin, Bellel, Cicéri, &c., appears very *demodée* by the side of the Normandy prairies and other landscapes in the severe style of M. Damoye, the cool shaded pools of M. Péraire, the verdant plains of M. Pelouze, the "Fin d'Été" of M. Pointelin, the river-banks of MM. Galerne and Zuber, and the red heather of M. Poitevin. M. Français alone seems always to keep the same position, and his landscapes from the Vosges country are painted with a power which age has in no way impaired. M. Rapin does not progress in the right direction, and the prevalent yellow tone of his landscapes is very disagreeable. The Provence landscapes by MM. Allegrè, Casile, Sain, Olive and Decanis, on the other hand, are remarkable for the bright atmospheric effect and the manner in which they convey the warm colouring of that pleasant district of sunshine.

For some years past, scenes from Paris itself have become increasingly numerous among the landscapes. Paris offers plenty of subjects, but they mostly require a special talent to treat them successfully. M. Luigi Loir, who was one of the first to set this fashion, exhibits this year a view of the Pont Solferino and the Quai d'Orsay during a flood of the Seine. M. Lesine has selected the Ile de la Cité for his subject; M. Pierre Vauthier, the Pont National at Bercy, and M. Alfred Smith, the Place de la Concorde during a shower of rain. M. Réné Billotte, who makes consistent progress in this class of work, keeps generally to the Parisian suburbs, and this year exhibits two such studies very correctly and carefully painted. It is a pity M. Dumoulin has quitted Paris, which he knows so well, for Japan, of which he exhibits two very insignificant "Japanneries."

Among the landscapes is also to be mentioned a grand Norwegian landscape by M. Normann, with snow-white mountains reflected in a wonderfully clear lake. Among the sea-pieces, one can only name, out of a number, the "Havre" of M. Boudin, the "Bateaux de Pêche" of M. Maurice Courant, the "Soleil couchant sur les falaises" of M. Dieterle, the "Plage de Villesville" of M. Guillaumet, and the sea-side scenes in Holland by M. Mesdag.

Animal painting is represented by a great number of pictures; cows "en pasturage" by MM. Barillot, Dieterle, and Julien Dupré, sheep by M. Charles Jacques; there are also good pictures

of this class by M. Guignard and M. Princeteau. The former, in his "Embarquement des Vesteaux," has surpassed any of his former work. The latter exhibits an "Attelage des Bœufs" in a vineyard at Pressoir, a picture painted with a kind of intentional and ostentatious rudeness of execution, but full of life.

In M. Carolus Duran's exquisite portrait-group of two blonde-haired children in dark blue, we find all his old qualities in this class of painting, and are enabled to forget for the moment his mythological errors. Further we come on the last portraits painted by Cabanel; a woman in black velvet relieved against a blue ground, and whose hands are beautifully modelled, and a portrait of a young blonde lady in a white dress which the painter left unfinished. These works are examples of Cabanel's learning in the art, and of that incomparable grace and elegance which he imparted to the feminine portraits by which he chiefly made his reputation. On the death of Cabanel, his mantle seems to have descended on M. Jules Lefebvre, whose portrait of a lady in a velvet dress is most beautifully executed.

M. Jean Béraud has grouped, in a small picture, the principal contributors to the *Journal des Débats*, including a number of well-known political men and Academicians, Léon Say, Bardoux, Jules Simon, John Lemoine, Renan, &c. In the portrait of Henri Rochefort by M. Van Beers, the artist has not forgotten a wrinkle of the worn face nor a lock of the rebellious hair; it is a facsimile which almost approaches caricature. M. Krug exhibits a fine portrait of M. Freyen-Per.in on his death-bed; M. Hébert has sent a good portrait of General Miribel. Another good likeness is that of the sculptor Soitoux by M. Giacomotti. We may mention also the portraits of ladies exhibited by MM. Benjamin Constant, Cormon, and François Flameng.

We must conclude here a notice necessarily short in comparison with the amount of work exhibited, but in which we have endeavoured to be quite impartial in our selection. What strikes one most is the relative inferiority of the Salon in comparison with the "retrospective" collection at the Great Exhibition. The sum of talent is, perhaps, about the same, but there is a want of remarkable works, above the average, and such as strike and compel the attention of the spectator. The collection as a whole is, with few exceptions, colourless and devoid of special features; and this general impression of mediocrity, which only the landscape section escapes, proves once more the injurious influence of official training, except in regard to mere primary instruction, on the artistic character and originality of the younger generation of painters.

ROYAL INSTITUTE OF BRITISH ARCHITECTS:

THE ROMAN THERMÆ.

AT the ordinary general meeting of this Institute, held on Monday evening last at 9, Conduit-street, Mr. Alfred Waterhouse, R.A. (President), in the chair,

Mr. W. H. White (Secretary) announced the decease of Mr. Edward Preston Willins, Associate, of Norwich.

Mr. White also read the nominations of a great many proposed new members, including forty-four Associates, the President remarking that it was gratifying that all those gentlemen had passed the necessary qualifying examination.

Professor Aitchison, A.R.A., then read a paper on "The Roman Thermæ," of which the following is an abstract:—

Illustrating, as their very ruins do, the size, splendour, and durability of Roman monuments, the author considers the Roman Thermæ to be a subject of considerable interest to architects, and peculiarly so to Englishmen, as Richard, Lord Burlington, the architect, was the first who brought to light Palladio's drawings and restorations of them. Lord Burlington published engravings of these drawings in 1730, and since, other notable works have appeared,—Cameron's "Baths of the Romans" in 1772, with a second edition in 1775; O. B. Scamozzi republished them in 1785, and the greater part were again published by Canina in his "Architettura Romana" in 1834. In 1828 Blouet published a monograph on the Baths of Caracalla; and during recent years Baron H. de Geymüller and Count Nispi-Landi had each published a monograph on Agrippa's Thermæ. The author considers those of Agrippa to be the first Thermæ built at Rome. The Thermæ combined three main uses,—schools for teaching gymnastics, exercising-grounds, and baths. There was also a grand stand to the race-course, an aqueduct to supply the water, and tanks to heat it, walks adorned with seats and statues, and halls for philosophers and others. The gymnasia and baths mostly formed a central block, separated by the grounds from the surrounding buildings, of which a considerable portion were, in some cases, shops or lodgings. Having dealt in detail with the various athletic exercises of the Romans, and the various officials and their duties, Professor Aitchison proceeded to describe a part of the Greek Gymnasium, in order to show how much of it the Romans retained. It consisted of two peristyles, with surrounding cloisters, and spacious halls beyond. The outer court was, in the Roman Thermæ, merely a part of the ground; but the first court, with its buildings, was doubled and kept in the central building, and usually had a single portico or cloister all round. At the back of that to the south was a hall called the Ephebeum; to the right of this was the Coryceum; next it, the Conisterium, or dusting-room; and beyond this the cold bath. To the left of the Ephebeum was the oil-store and anointing-place; next to this the Frigidarium, and thence was a passage to the Propnigeum, or furnace. In the turn of the portico was the vaulted sweating-chamber, with the Laconicum at one end, fronting which was the hot bath. In the time of the Empire women participated in the exercises, although whether privately or in company with the men was not now known. Vitruvius's information about the hot bath was almost nothing; but Pliny the younger, Seneca, and Lucian somewhat supplied the want; and, having quoted from Pliny's description of the baths at his Laurentine and Tuscan villas, the author proceeded to describe various sorts of bathing and the habits of bathers, giving a list of the bath-servants. He then dealt with the Thermæ in order of time, taking first those of Agrippa, built about 27 B.C. On either side was a peristyle, and fronting each an oblong hall, with semicircular ends, communicating at one end with a single room, and at the other with three. The oblong hall was evidently the front entrance to the Gymnasium; the one room, perhaps, the porter's lodge, and the three undressing-rooms. At the other end of the peristyle were two rooms,—possibly the Elæothesium and Conisterium, or the attendants' rooms; and next there was a doorway into the end portico of the Piscina. The Tepidarium, into which were two entrances, could not be mistaken for any other room. It had four enormous piers to abut the vault, and two recesses for the floor-baths at each end; the middle bay formed shallow transepts going up to the screens of columns to the Piscinæ. The same arrangement was found in all the Thermæ, from Agrippa's to Constantine's, and at Caracalla's some of the floor-baths still existed. The hemicycles at each end might have been cooling-rooms, and in the centre of the upper one was an entrance into an oblong court which led into an enormous hall, while beyond the apse was the Pantheon. If the Pantheon had not been originally built for the Laconicum, what had it been built for? Not for an entrance-vestibule, as it led into the hottest room. It had a likeness to the Laconicum of Caracalla's, and even to that of Constantine's, Thermæ. The author believed the four rooms on either side of the back front, which were entered from the grounds but communicated with one another, to have been the baths which originally belonged to the Gymnasium. The next Thermæ were those of Nero, 54 to 68 A.D. The chief alterations from Agrippa's were that the two swimming-baths were made into one in the front, the Ephebeum was converted into a large apse, the Tepidarium was increased in length by a vast vaulted hall at each end, and there were some small chambers, possibly for sea-water and sulphur baths. There was, however, no circular Laconicum. The Thermæ of Titus, 78-81 A.D., resembled Nero's very closely, and the chief peculiarities were the two long arcades going from the wall of the Ephebeum to within about 33 ft. of the enclosure of the grounds, and a square building in front of each Gymnasium, containing a circular chamber nearly 82 ft. in diameter, which Professor Middleton believed to be Laconica. Another bath, called by Palladio the Thermæ of Vespasian, 69 to 79 A.D.; by Cameron, Domitian's, 81 to 96 A.D.; and by other writers, Trajan's, 98 to 117 A.D., was supposed by Professor Middleton to have been for women only. Next came those of Caracalla, 211 to 217 A.D., described by Ælius Spartianus as the "exquisite baths of Caracalla." The solar cell was a marvel in that writer's day, but which was the solar cell was only settled by Professor Lanciani in 1873. It was the swimming-bath (Piscina), the flat roof of which was carried by T-iron girders. The carrying a flat terrace 180 ft. long, with a span of 76 ft., probably 2 ft. deep, would not, the author considered, be so very easy to construct even in the present iron age. Although the plan was pretty, that of Agrippa bore the palm, the two giant apses in which, looking down the Tepidarium instead of into the Gymnasia, producing a more splendid effect. In the plan of Caracalla's, every feature of Agrippa's was recognisable, and, having described them in detail, the author dealt in like manner with the Thermæ of Diocletian, which were the largest erected in Rome. The site of the grand stand was now the Piazza dei Termini, in which the Via Nazionale terminated; so those who had seen Rome lately could judge of its vastness. The central building bore a close resemblance to the other Thermæ, except that in the gymnasia the peristyles went completely round. The last Thermæ given by Palladio were those of Constantine, 306 to 337 A.D., the Tepidarium of which bore a close resemblance to Nero's. The circular Laconicum, similar to those of Agrippa and Caracalla, again made its appearance, but the old form of Gymnasium had disappeared. With the exception of Nero's Golden House, no buildings were so splendidly finished as the Thermæ. Agrippa's alone were without that most gorgeous of all decorations, glass mosaic, as it was not then invented, its place being supplied by encaustic painting. In subsequent Thermæ the walls were lined with coloured and polished marbles, and the vaults with glass mosaic. The larger columns in the Thermæ were mostly of granite, while those of secondary size were of red porphyry, of cipollino, pavonazzetto, giallo antico, and other marbles. Buildings more sumptuously finished could scarcely be imagined, while they were adorned, too, with the masterpieces of Greek sculptors.

Mr. Arthur Cates, in opening the discussion, said it was in no formal manner that he rose to move a vote of thanks to Professor Aitchison for the delightful discourse he had favoured them with that evening. It took him back many years,—to days now long past,—when Dr. Burgess, Mr. Ashpitel, and other members of the Institute, read papers illustrating the architecture and customs of ancient Rome. It was a great satisfaction to all of them that they had now some indication of a revival of these most agreeable and instructive evenings, and he hoped they might consider that the paper they had just heard, which had dealt generally with the plans of, and with the customs connected with, the baths, was simply a precursor of a series of annual or more frequent discourses they would receive from Prof. Aitchison. The discourses with which Dr. Burgess favoured the members annually for many years took them over a series of great interest. Since that time there had been considerable discoveries, which had extended their knowledge, and many of those who heard Dr. Burgess and Mr. Ashpitel had passed away; so that there was room for a fresh series, which the Professor had so well inaugurated that evening. The subject was one which possessed much interest, and required considerable and close study to appreciate the differences that had arisen between antiquarians as to the appropriation of parts of those baths. He was somewhat surprised to find Professor Aitchison upholding the assumption that the Pantheon was part of the Baths of Agrippa. The theory of some of the architects of the last century, that the Pantheon was a vestibule to the Baths of Agrippa, always appeared to him entirely untenable, and he did not feel inclined to give more support to the theory Prof. Aitchison had put forward, viz., that it was intended for a laconicum. If it had been intended as part of the baths, no doubt when the magnificent apartment was cleared from the scaffolding, and appeared in all its grand and striking glory, it must have seemed too splendid even for a magnificent Roman bath. But he could not think from its position on the plan, and from its other arrangements,

that it had ever formed a portion of the bath. On looking at the plan they would see that the athletes probably used the spaces on either side of the Pantheon as places of exercise, and there must have been some arrangement of porticos or colonnades which would have given the plan a different appearance to that which it occupied at present. He therefore hoped Professor Aitchison would not bind himself to the theory that the Pantheon had been the laconicum of the Baths of Agrippa, but would further consider the subject, and perhaps find from some authority on the matter some indication of the structures which occupied the space on either side of the building. The general description given by Professor Aitchison applied very well to what was known to us as the Turkish bath, and it was to be regretted that in our great cities we had not such baths on a larger scale than those which private enterprise had yet been able to found. The municipalities had established what they called "baths and wash-houses," but those institutions did not contribute to more than a superficial removal of dirt. If, however, the municipalities were more enlightened, and could appreciate the value of the hot-air bath, they might erect such baths, constructed on the same principle as the Roman baths, which would be really of service for the cleansing of the epidermis of the people. Unfortunately, in these busy days, a bath of that description occupied too much time, and also required the exercise of considerable discipline on the part of those who used it. It was therefore quite possible that both the consumption of time and the necessary submission to severe discipline might render a bath of that kind not agreeable to the classes to whom it would be most beneficial. At the same time, the people might be educated up to it, and there was no doubt those great baths of Rome were simply the developments of smaller establishments in general use long before the time of the Emperor Titus or Caracalla. Thus from small commencements we might hope that the excellent Roman bath would be established amongst us again as it once existed when England was an appanage of the Roman Empire. Throughout England Roman baths of some magnitude were to be found, as, for instance, the one in the city of Bath, which had been happily preserved, and which, comparing Rome with Britain, was equal in proportion to the great works of the Eternal City (applause). He would commend to those who were interested in the subject the study of the Roman bath at Bath, the beautiful model of which, exhibited at the Health Exhibition at South Kensington three or four years ago, attracted considerable attention. Mr. Cates expressed his thanks to Professor Aitchison for the pleasure he had given by his admirable paper, and by the manner in which he had dealt with the design and construction of those great buildings. Under his hands they would no doubt have much information respecting the design and the proportions of those vast halls, which even in their ruins were so admirable and stupendous in effect. And from what he had heard of the Professor's lectures at the Royal Academy,* there was no doubt he would be able to give them on a future occasion an admirable discourse, which would be even more interesting and valuable than the paper he had just read (applause).

Mr. A. S. Murray said it was always a great pleasure for him to be present at a meeting of the Institute, but it had been specially pleasant and instructive that evening, as was to be expected from such a subject in the hands of their kindest of friends, Professor Aitchison. On the way there he had been thinking of the subject of Roman baths, and became very much astonished at the depth of his own ignorance about them; but after listening to the lecture, bristling as it did with learned research and ingenuity, he had come to the conclusion that his ignorance was not so much to be ashamed of. At all events, he had learned much that evening, and would be able to carry away a great deal, so that in future he need not be so frightened as he had been at the Museum when people came to him with questions about the Roman baths. In the name of Classical archæologists, he might venture to offer their thanks to Professor Aitchison for having worked at that puzzling and difficult subject, and brought his materials in such a concentrated form altogether for their benefit. He begged, therefore, heartily to second the vote of thanks (applause).

Mr. Alexander Payne asked Prof. Aitchison if researches had been made to discover how those large baths were warmed? He remembered noticing in the baths at Pompeii that there were not only hypocausts under the vaults, but also hot air was used as a means of warming. He would like to ask the Professor if the same arrangement was used in Rome, or was hot air forced into the rooms in any way?

Mr. Cole inquired whether there was now the slightest trace remaining of the entrance to the Pantheon from the building in the rear? One knew that a bricked-up doorway kept its appearance through ages, and it was likely that if the Pantheon was used as a laconicum to the Baths of Agrippa there would be some faint trace of its connexion with the other portion of the baths. Mr. Cates had suggested that Professor Aitchison should favour them with some future paper, giving information as to the construction and details of the baths. But there was one point in which he felt very much interested in the Professor's recent lectures at the Royal Academy, and that was the mention of the recent discovery of an iron roof of considerable size. If the Professor would give some idea of that, it would be interesting, as they had all along fancied they were the first people of these later days who knew anything of iron roofing, and to hear of such a thing being used on a large scale in Roman times was news to some of them.

The Reverend C. L. Acland (Colchester) said that there were one or two words he would like to say. The only excuse he could give for himself was that he had charge of one of the most important collections of Roman antiquities in Britain, and that he was thoroughly conversant with the antiquities of the old Roman town of Colchester. There was no doubt that these baths served very much the same purposes as were now served by our modern clubs. They were not only bathing-places and gymnasia, but great meeting and assembly places, which corresponded very nearly to the clubs of the present day. In fact, a vast amount of what might be called "underground politics" and work of various kinds was transacted there which could only have a very indirect connexion, if it had any connexion at all, with the ostensible purpose of the buildings themselves. And when they found, age after age, more and more magnificent buildings raised up in Rome for those purposes, it was as well not to lose sight of the political aspect of them. The Roman thermæ at Bath had been mentioned. At Colchester, although it was a Roman town for a long period, he did not think there were any remains of baths to be found, although there must have been thermæ there. With regard to the athletic training which took place at the baths, it also had to be borne in mind that there was this great difference, that the Greeks seemed to have done their athletics for themselves, as young Englishmen did, while the Romans preferred to have their athletics done for them. At all events, in the later days of the Roman Empire they found professionals occupying a position which had clearly no parallel in Greek training. He had no doubt that the Greek athletics were familiar to all those present, and if they could bring forward any of the Greek athletes nowadays, they would in all probability "break records" at a great pace, and it would be found that they would compare more than favourably with the greatest athletes of the present day. Their athletic training was to a great extent the cause of the extreme beauty of the human form, which certainly reached a pitch amongst the Greeks it never acquired anywhere else so far as we knew, and there was also a training of the eye and a skill in sculpture which gave such models of perfection of the human form as probably were never brought into existence elsewhere. To the Greek training schools, therefore, was due the greatest perfection of the human form (applause).

The President remarked that Professor Aitchison had mentioned that the Roman baths had been the means of securing to posterity the finest dome in existence, and also the widest vault; and he was curious to know what that vault was, and its width. There was no doubt that they must have been enormously wide, as could be seen from the vaulting in the Baths of Agrippa, which was 68 ft. wide. The Professor had spoken about the Baths of Titus and of a chamber paved with *lapis lazuli*, and then he seemed to throw some doubt upon the subject. He was much interested in the Professor's reverting to the general appearance of St. Mark's, because he supposed St. Mark's gave them one of the best ideas of the general internal finishing of a large Roman bath that could be found nowadays, both as to its mosaics and its marbles on the walls and floors. He entirely sympathised with the expressed hope of Mr. Cates that such papers as they had heard that evening might lead them to think more about the advisability of larger baths being erected for the use of the public than had been hitherto built. It seemed a disgrace to the civilisation of the present day that people should be content with the very mean buildings now erected for that purpose (applause). The members were also very much indebted to Mr. Acland for his remarks on the use of the baths. It seemed impossible to suppose that such enormous buildings should have been reserved only for bathing purposes; but when, as Mr. Acland had explained, they seemed to have been used very much as clubs, and especially as political clubs, one could understand their size and magnificence.

The vote of thanks was then put and carried by acclamation.

Professor Aitchison, in replying, said that in bringing forward the subject, it appeared to him that it would be an interesting one to a body of architects. There were many things to be found out and learned from those baths of the Romans,—indeed, many more than he had hinted at. He himself had had conceit enough, when he took up the subject,—knowing that he was an old Turkish bather, knowing something about athletics, brought up as an architect, and having some slight remnant of the classical lore of the schools still hanging about him,—to think he was going to throw a light upon the subject which had never been shed upon it before; but in that he was disappointed, finding that he had ended in very much the same state of ignorance as that in which he began. He had, therefore, brought the matter before the Institute in the hope that amongst all its learned and skilled members there might be some who would be induced to study the subject. Indeed, he had the conviction that if a great number of intelligent people were interested in the matter, and would devote some of their spare time to it, they would at last get to know more about it than had ever been known since the time when the baths were erected. That it was not altogether a useless subject for the consideration of architects was evident from the fact that the Romans were the most practical people that the world had ever seen, as well as the greatest organisers, and they might be quite sure that whatever was done by the Romans was done with the most precise business knowledge. The architects of the present day could not do better in some of their spare time than ask themselves why and how these things were done. The subject was so large that he had been unable to treat it on all sides. Mr. Cates was kind enough to speak of him in very flattering terms, and to ask a great many questions, which, he was sorry to say, he was not in a position to answer. The Baths of Agrippa,—which must have been built when Vitruvius was an elderly man,—were exactly opposite in position to what he recommended. That is to say, that the hot rooms should be at the south, while here they were at the north. The reason for this could only be settled by knowing what the peculiarities of the site were when they were built. Lucian, in speaking of his friend the architect, Hippias, who had built some baths, stated that he very properly kept the cold rooms at the north, and the hot bathing-places at the south. The question of the Pantheon was a very burning one. Professor Middleton said he was there when some of the pavement was taken up. There was then no hanging floor, no vertical flue-pipes, yet the lecturer was confident he had read somewhere that in some of the alterations to the chapels of the Pantheon vertical flue-pipes were found. He had written to Mr. Stillman on the subject, but that gentleman said he knew nothing about it, but his impression was the same. He had written to another friend in Rome, from whom he had not yet an answer. Professor Middleton, however, told him there was nothing found in the shape of furnaces, nor hollow floors, nor flue-pipes,—nothing but the drain that took the water off that came through the eye. In comparing the Pantheon with the Laconicum of Caracalla's Baths, and also with that of Constantine's Baths, it would be seen that the circular plan was repeated, showing that there

* These lectures, we may say, have been fully reported and largely illustrated in the current volume of the *Builder*.—ED.

was a tradition of a circular building being used for the laconicum, not to speak of Vitruvius's directions. There was no doubt about the use of the Laconicum in Caracalla's Baths, and its having been lined with flue pipes. Any one who saw the Pantheon would at once imagine that it had been built for a laconicum, but beyond that he was afraid he had nothing more in the shape of argument to offer. Mr. Payne had asked about the hypocausts and pipes, but the only baths now remaining at Rome which could throw much light upon the subject were the Baths of Caracalla. The Baths of Diocletian had been turned into the Church of Santa Maria degli Angeli, while it had been impossible lately to get admission to the Baths of Titus, so that he had no opportunity of examining them. But Professor Middleton declared the two circular buildings had hypocausts and vertical flue-pipes. In Caracalla's Baths were to be seen now the remains of the flue-pipes, &c., with the piers, as Vitruvius had described them, supporting the floor, and the mortar of clay mixed with hair. There were flue-pipes going round the building, so that there could be no doubt about its use, and these flue-pipes had also been found in the Roman baths discovered in the City of Bath. Mr. Cole had asked a question about the Baths of Caracalla, but the lecturer found that his paper was such a long one that it would tire the patience of his audience, and he had therefore cut out a good deal of it which dealt with that part of the subject. Ælius Spartianus,' in speaking of the Baths of Caracalla, said there was a solar cell, which was built with latticed beams of bronze, which carried the roof in such an extraordinary way that persons in those days declared it was then impossible to do anything like it. This solar cell was at one time supposed to be the laconicum, but when this was cleared out, some masses of concrete, which formed part of the dome, were found on the floor, and it was thus conclusivly shown that it could not have been the laconicum. Lord Savile, our then Ambassador at Rome, took the trouble,—although the Professor was a perfect stranger to him,—of asking Professor Lanciani to give him any information he had on the subject. Professor Lanciani told him that when the piscina was excavated, an immense quantity of pieces of wrought T-iron were found, and also bars of iron with T-ends embedded in the concrete. The thickness of the floor and roof did not appear to be above 2 ft. or 2 ft. 6 in. at most. No doubt, when the barbarians invaded Rome they "looted" the bronze, while they left the old iron. It was by means of these T-iron girders that the roof was carried. He did not fancy it was all built over, but that there was a space all round, solidly covered with concrete, with the rest either open or covered with skylights, and the iron embedded in the concrete was for the purpose of carrying it from girder to girder. It would not be a bad subject, he thought, for the competition for the Grissell Prize to show how a flat ceiling, with a span of 76 ft., could be made, with an ambulatory of concrete and mosaic, and with a centre skylight. What he had said only showed that we at the present day, who consider ourselves masters of iron construction, were, perhaps, not so much in advance of the Romans. In answer to the Rev. Mr. Acland, there was no doubt the Roman Thermæ were greatly used for a variety of purposes, but he did not know that they could be termed "clubs," which hardly conveyed the idea of the number of people assembled. They were, in fact, combinations of all sorts of things—public gardens, picture and sculpture-galleries, conversation and lecture-halls, for discussion, for music possibly—as well as baths and exercising grounds. Doubtless, too, the Roman Emperors felt very much with the enlightened governments of the present day, that it was far better to have their doings canvassed in public places than in private clubs, and, therefore, they rather encouraged political discussion in the Baths. In free countries the Governments found the newspapers most useful, and there was little doubt that so astute a person as Augustus Cæsar was not blind to the advantages to be gained from open discussion. A great many people must have passed most of their time in the Baths, and many lived there. Mr. Acland had referred to the training of the Greeks. The speaker had not enlarged upon that subject, or else he might have bored them with an entirely new lecture. The Greeks were the first people who ever made painting and sculpture, in the proper sense of the word, possible. They saw what was to be gained by training the body to hardness and beauty, which also invigorated the mind, thus becoming the most intellectual people the world had ever seen. The Greeks, loving the beautiful, and wishing to immortalise those things which they considered of vital importance, had opportunities which no other people ever possessed. Anyone at the present day who had a love for sculpture could only study it by having models, but in the old Greek times any one who had a taste for it, and who thought it was doubtful whether a certain muscle in a statue showed in a certain direction, had only to go and see the athletes training. The Romans carried on their athletic training in a much less degree, and at last it became confined to professional athletes. In answer to the President, he might say that the tepidarium of Caracalla's Baths was nearly 80 ft. wide. The nave of St. Peter's was said to be from 82 ft. to 86 ft., but he believed the 142 ft. 6 in. the diameter of the Pantheon was the greatest dome built of materials exclusive of iron that existed in the world. As to the paving of *lapis lazuli*, Corsi, in his description, said that in the time of Innocent X. one of the halls of the Baths of Titus was found to be paved with *lapis lazuli*, but he did not say which chamber it was. He hoped that those who were interested in the subject would look into it and endeavour to throw as much light upon it as possible. The reading of some of the classical authors, and especially the less known semi-classical ones, might throw some light upon the matter, and if a large number of persons would only turn their attention to it, great advantage could not fail to accrue. Anyone, too, who would take the trouble of examining the Baths, would find there was a great deal to be learnt which could be usefully applied in the present day (applause).

The President then announced that the next meeting would be held on June 3. The meeting would be a business one, for the election of the Council and the Standing Committees for the ensuing year, after which a paper would be read, the title of which would be announced in the "Journal of Proceedings."

The meeting then separated.

THE ARCHITECTURAL ASSOCIATION.

THE last ordinary meeting of this Association for the present session was held on the 17th inst., in the meeting-room of the Royal Institute of British Architects, Mr. Herbert D. Appleton (President) in the chair.

The following new members were elected,—viz., Messrs. T. Honnor and W. W. Powell.

The rules relating thereto having been submitted and read, the affiliation of the Glasgow Association was unanimously agreed to.

It was announced, amid applause, that the Travelling Studentship had been awarded to Mr. A. E. Bartlett, and the second prize to Mr. Percy D. Smith; Messrs. Sydney K. Greenslade and Ernest E. Fetch being bracketed equal for honourable mention. It was also announced that the Cates Prize had been awarded to Mr. Banister F. Fletcher.

The President announced that the late Mr. C. R. Pink, Past-President, had bequeathed the whole of his architectural books to the Association.

The first vacation visit, it was announced, would take place on June 1, to the new buildings at Eton (Mr. Blomfield's), and the old buildings will also be shown. The second visit would be to Parham, Sussex, on June 15.

Mr. D. J. Blow then read a paper entitled "A Travelling Students' Notes," which, together with some notes of the discussion which followed, we print in subsequent columns.

Mr. W. W. Burrell afterwards moved a vote of thanks to Mr. Appleton for his services as President during the past session. He said Mr. Appleton had given them both his time and attention, and had always worked in the interests of the Association during the session as well as in the vacation, and he deserved their hearty thanks (loud applause). He was glad to see that the members appreciated the services of a man like Mr. Appleton. It seemed unnecessary to say more, their feelings seemed to be heartily in accord (renewed applause).

Mr. A. B. Pite, in seconding the motion, said that the former services of Mr. Appleton as Hon. Secretary to the Association induced them to form the highest possible hopes of his occupancy of the chair, and he (Mr. Pite) ventured to say, on behalf of his fellow members, that Mr. Appleton had more than fulfilled their highest expectations (applause).

Mr. A. O. Collard said he rose with very much pleasure to support the resolution. He could speak from a different standpoint than Mr. Burrell, for the reason that he had had practically nothing to do with Mr. Appleton in the working of the Association, beyond acting on one committee. They all thoroughly knew and appreciated the real energy which Mr. Appleton showed in everything he took up, and the extraordinary amount of attention he gave to the affairs of the Association (applause).

The resolution was passed by acclamation.

The President said he retired from his present position with the very greatest pleasure (laughter), to seek the obscurity which so well suited him. He had only two feelings, and one was that he left his exalted sphere with heaps of friends and not a single enemy (applause).

The President again rose and said he wished to propose a vote of thanks to Mr. J. Douglass Mathews, who retired this year from the Treasurership of the Association, after the long service of twenty-five years. During that time Mr. Mathews had most faithfully fulfilled the duties of his office, which was not altogether an easy task. He was sure he would have the support of everyone present in proposing this vote of thanks (prolonged applause).

Mr. H. W. Pratt said he should like to be permitted to second this vote of thanks. As Assistant-Treasurer, he had been brought into intimate contact with Mr. Mathews during the last few years, and he could speak with knowledge as to the conscientious way in which Mr. Mathews had undertaken and carried out the work of the Treasurership. It was a most unprecedented thing in the Association that a man should serve in an office anything like twenty-five years. He was sorry that Mr. Mathews was not present, because he could have told them better than anybody else how the Association had grown, and what work it had done during those twenty-five years. At the present time they had an income of something like 1,000*l*. He supposed twenty-five years ago it was not a third of that amount, and, of course, the work now was considerably greater. Nevertheless, Mr. Mathews had kept at his post all through these years, and had served the Association in a way which they had really no idea of, unless they had had the pleasure of auditing the accounts, which would give them an insight into a little of the work. He was sure they would very cordially carry this vote of thanks to Mr. Mathews for so thoroughly well and conscientiously serving the Association during that very long term of years (applause).

The resolution was cordially agreed to.

Mr. H. O. Cresswell said there was one very excellent functionary to whom he wished to propose a vote of thanks,—a very energetic, hard-working member of the Committee. He referred to Mr. Pryce (applause). He thought no one who had not worked on the Committee, or been intimately associated with the sub-committees for any time, had any idea what the work of the Secretary of the Association was. There were two secretaries, but the work of the senior secretary was extremely heavy, and if he did not have a junior secretary who gave him loyal assistance it would be impossible to carry on the work. He thought Mr. Pryce had had that in Mr. Farrow (applause). Mr. Pryce was retiring from the Secretaryship; but he congratulated them that they would not lose his services, because he was to occupy the honourable position of one of the Vice-Presidents. Mr. Pryce had worked for them morning, noon, and night, and he thought he was entitled to their warmest thanks (loud applause).

Mr. Banister F. Fletcher expressed pleasure in seconding the resolution, which was carried with enthusiasm.

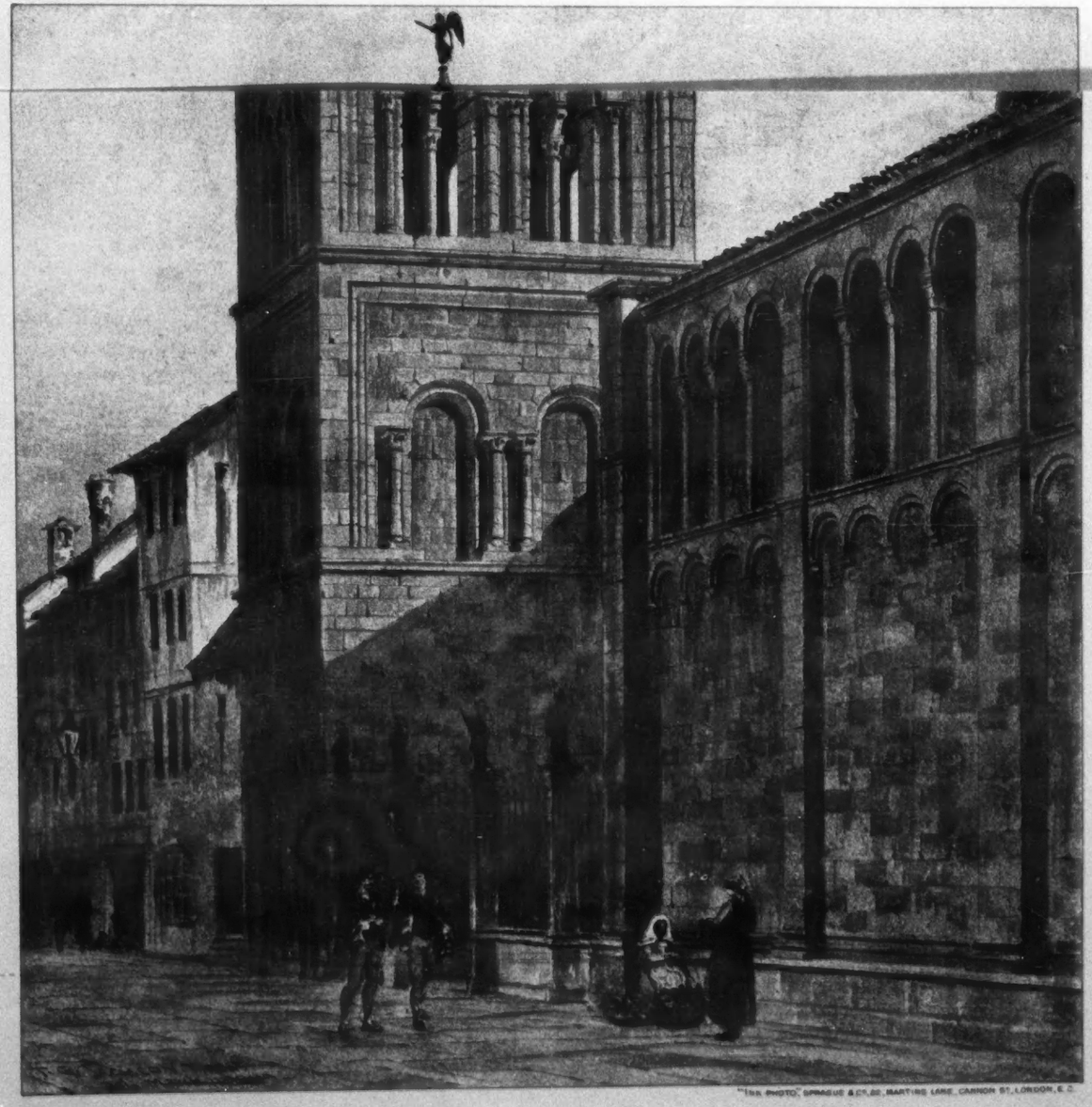
Mr. T. E. Pryce acknowledged the compliment, stating that he was sorry to some extent that his Secretaryship had ended, but he could now look back upon it with a vast amount of pleasure (applause).

It was not until a quarter to eleven that the scrutineers (Messrs. Parks, Wimperis, Webb, and Earl) reported that the following officers had been elected for Session 1889–90, viz.:—

President.—Mr. Leonard Stokes.

Vice-Presidents.—Messrs. W. Burrell and T. E. Pryce.

Committee.—Messrs. H. D. Appleton, F. T. Baggallay, W. H. A. Berry, A. C. Bulmer Booth,



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The announcement that Mr. Stokes had been elected as President was received with loud and long-continued cheering, and after a vote of thanks to the scrutineers, the meeting broke up.

Illustrations.

"HATCHLANDS," SURREY.

THIS effective and picturesque drawing appears to represent additions to an ordinary Georgian house, in the way of a colonnaded cloister, a formal garden and a balustrade fence walk. It makes a good picture, and the trees (as usual) assort well with the Classic details; but as, owing to accidental circumstances, the architect (Mr. Halsey Ricardo) has been prevented from communicating to us, in time for publication, any further particulars, we must for the present leave it simply as a picture.

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THE Cathedral of Zara in Dalmatia, as described by Constantine Porphyrogenitus in the tenth-century, appears to have been a basilica of Byzantine architecture resembling that of Parenzo in Istria, or those of Ravenna. Of this church, however, very few traces remain. Whether it was ruined at the storming of Zara in 1202 by the French and Venetians of the fourth crusade, or whether it survived that catastrophe, is uncertain; the accounts of the several historians differ. But however this may have been, it is certain that the rebuilding of the duomo was undertaken early in the thirteenth-century by Archbishop Lorenzo Periandro, a native of Zara; the money, according to one account, being found by the penitent Crusaders, though this is very doubtful.

Though the church was not consecrated till 1285, and the west front was not built till 1324, and not wholly finished till a century later, the whole building is in the Romanesque style, which in Dalmatia lived on through the whole period during which in the rest of Europe it had yielded to Gothic, and actually survived till it met and gave way to the new round-arched style of the Classic Renaissance. The west front, with its tier above tier of round-arched arcading, and the similar arcading of the north wall, part of which is shown in the illustration, recall the Romanesque churches of Pisa, Lucca, and Pavia, and might easily be mistaken for work of the eleventh or twelfth century.

The campanile stands detached from the duomo, and though it was not begun till 1480, it is still in good Romanesque. It is the work of Archbishop Matteo Valaresso, whose magnificent pastoral staff,—a unique specimen of silversmith's work,—is preserved in the treasury of the Cathedral. His campanile was evidently intended to be a magnificent work, for the lowest stage, which is about 27 feet square, and rises to the height of 30 feet above the ground, is composed of solid masonry, with the exception of a small beehive-shaped chamber in the centre of this enormous mass of material. The campanile which this astounding substructure was intended to carry was evidently to be of unusual size and height, but the Archbishop's magnificent project was checked by the interference of his relatives, who did not desire that his patrimony should be exhausted in this way, and perhaps also by the jealousy of the Venetian Government. His tower, therefore, stopped short with its second stage, and the five bells of the Cathedral now hang at that modest elevation under a temporary roof. Funds are being collected, however, for completing the campanile on a scale worthy of the interesting duomo to which it belongs, and of the dignity of Zara, as the capital of Dalmatia.

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THE CHURCH OF ST. LUKE, RICHMOND.

THIS church, of which we give interior and exterior views, has just been consecrated by the Bishop of Rochester. The plan given will explain the arrangement. There is a heating chamber under the vestries. Outside, the walling is of Casterton stone, with Ancaster and Bath stone dressings, and the roofing is of red tiles, with overhanging eaves to the nave. Inside, the columns and responds, with bases and caps, the arches, strings, and all external angles, are of stone. The mouldings are elaborate, but there is little carving, and that in the chancel. There is a brick dado round the walls; the general flooring is of wood blocks, with black and white marble paving in the chancel. The nave roof is of open timber, with curved ribs; that of the chancel is wood-groining. There is an arcade of stone at the east end. The screens round the chancel, and the stalls, will be oak; the general seating of that material is now fixed. The work was carried out by Mr. Dorey, of Brentford, and Mr. J. Watson acted as clerk of works. The architects are Messrs. Goldie, Child, & Goldie.

A TRAVELLING STUDENT'S NOTES.*

MR. PRESIDENT AND GENTLEMEN,—I must first apologise to you for not having prepared in a better manner my notes for this evening. Owing to the happiest and most delightful circumstances, I was obliged to leave last June the then but shortly commenced pleasures of this studentship, and was not able to recommence that same work at Beauvais Cathedral until last March. No doubt some of you, or may it be many of you, are well acquainted with, and have been allowed to study, this glorious example; and those who have that pleasure to come will have heard of,—or may have even in passing through the town on one of those delightful preliminary tours of sight-seeing before deciding at which place to settle down for serious work,—gazed up with wonder and astonishment at this choir of choirs,—spun like a cob-web in the air,—so that you will understand the difficulties, or rather impossibilities, of doing justice to so grand an edifice, either by drawing or description, in so short a period. Still, with vain and foolish calculations, I had hoped to finish a part of the apse by now, but practice soon showed me the absurdity of my speculation, so that I have broken the thread of my work for a few days, to show and tell you the little that I as yet know of Beauvais, and that I may return with the information that you can give me on the subject, wiser than I came.

About 991, Hervée, fortieth Bishop of Beauvais, laid the foundation of a cathedral dedicated to St. Pierre, which his successor, Roger de Champagne, continued. But in 1180 this edifice became the prey of the flames.

In 1225, Bishop Milon de Nanteuil, with the aid of the chapter, undertook the building of the present cathedral. The apse and choir, properly speaking, were commenced in 1247, and were completed October 31, 1272. It is thought that Eudes de Montreuil, architect to St. Louis, designed the choir. But, alas! this choir was built with insufficient funds, and with indifferent material, both as to quality and size, and on November 29, 1284,—but twelve years after its completion,—a large part of the vault fell in, causing so much damage that for forty years no offices were held in the cathedral. In 1337, Bishop Jean de Mavigny and his chapter desired to finish the choir, and chose as architect Enguerand le Riche, and it was then found necessary to subdivide the large bays on either side of the choir (the total length of which measures 84 ft. from the centre of the first pier to the centre of the fourth) by placing intermediate piers, and the apices of the semi-arches carried by these piers were blended into the then existing arch; the intermediate pier was carried up, dividing the original width of clearstory and triforium into two parts, and supported a new vaulting-rib, thus converting the quadripartite vaulting into hexapartite; in like manner, the vaulting of two of the bays on the north side and two of the bays on the south side of the choir-aisle was converted to hexapartite, the extra rib on the outside being carried by an intermediate pier, subdividing the corresponding large bay of the side aisle arcade. After this was done the work at the cathedral was stopped for over a century by various wars, and was not resumed until the 21st of May, in the year 1500, when Bishop Villiers de Isle-Adam laid the foundations to the transepts, the northern façade of which, being partly constructed at the expense of François I., was completed in 1537, and was executed from the designs of Martin Cambiche de Paris. The southern transept was executed from designs of the architect Michel Lalge, and was completed in 1548. But now, instead of continuing the nave, one bay of which had been started, the architect, Jean Vast, who succeeded Lalge, constructed on the piers of the crossing a gigantic flèche, 303 ft. above the apex of the vaulting, or 462 ft. above the transept-floor (this does not include the height of the cross at the apex of the flèche). It was pierced, forming a lantern, two-thirds of its height, but the piers, receiving no support from the nave, gave way, and this great spire fell but five years after its completion, on the 30th of April, 1573, at seven in the morning, on Ascension Day, just as the procession had left the Cathedral for the town, and this new disaster was not entirely repaired until 1576.

Thus we see Beauvais met with much misfortune. And now the apse, with its chapels, and the north and south side chapels to the choir, the columns to the three large bays of the choir, and the eastern aisles to the transepts form very nearly the entire remnants of the original structure. Let us first consider in the design of this cathedral the harmonious relations between the whole and its parts.

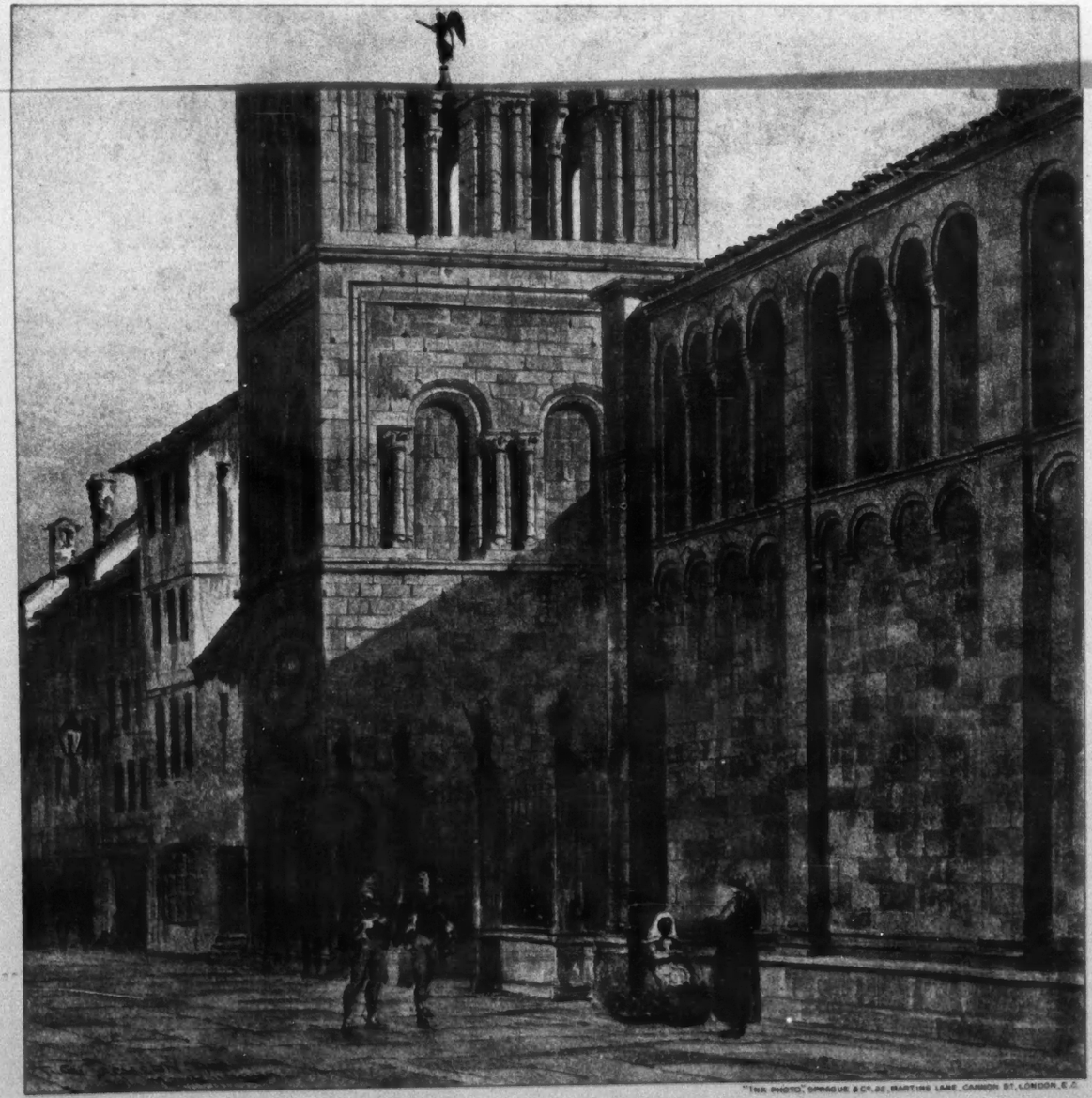
Here is a plan of the choir at Beauvais, the axis being at A. First of all the axes of the principal pillars which support the principal nave were fixed at 50 ft. distance from each other. At a point *a* taken in one of these axes, a line *a b* was drawn at an angle of 60 deg., giving at its intersection with the other axis the point *b*, the centre of a pillar like the point *a*. Drawing from the point *b* a line perpendicular to the axis, we obtain a point of intersection *c*, the centre of a third pillar. In this way the centres of the pillars have been arrived at. Still proceeding in the same way, and extending the lines inclined at 60 deg., a series of equilateral triangles is obtained, whose apexes give the line C of the intermediate pillars of the double aisle, and the exterior plain D of the side of the lower aisle. The diameters of the cores of the pillars of the central nave were fixed at 4 ft. 7 in., those of the intermediate pillars at 4 ft. 7 in. also, the thickness of the wall D at 5 ft. 3 in. Thus we have arrived at the axis, the distance between the pillars, and the width of the aisle, and we see that the distance between three of the pillars of the choir are equal, but also that these distances extend to more than half the span of the choir; for the axes of the pillars *a* and *c* are distant more than half the direct distance between the axes *c b*, whilst the axes of these pillars, *a* and *c*, are distant from each other one-half of the diagonal *a b*. There is thus both relation and dissimilarity, and this, as M. Violiet-le-Duc says, is one of the conditions of harmony from an architectural point of view, to avoid the apparent succession of equal divisions, but at the same time to have proper relations existing between them. In the same way, the distance been *a* and *d* is less than the distance *a c*, but this distance is equal to half the distance between axes *a e*. The space *d f* is smaller than the space *a d*, so that in a longitudinal direction the bays are similar; in a lateral they are dissimilar, and decrease towards the sides, which is, moreover, in conformity with the rules of stability.

But this choir opens into the transept equal in width to the principal nave. The architect saw that the great archivolts received by the pillars *a c* would exercise an active pressure upon the first pillar, *g*, of the choir, which is no longer propped at the height of these archivaults. First of all he increased the area of this column; then he decreased the space of the first bay, B.

At G, the architect intended to erect a tower over the bay of the transept, and therefore

* A paper by Mr. D. J. Blow, Travelling Student of the Architectural Association, read by him at the meeting of that body on the 17th inst., as elsewhere mentioned.

THE BUILDER, MAY 25, 1889.



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MR. PRESIDENT AND GENTLEMEN,—I must first apologise to you for not having prepared in a better manner my notes for this evening. Owing to the happiest and most delightful circumstances, I was obliged to leave last June the then but shortly commenced pleasures of this studentship, and was not able to recommence that same work at Beauvais Cathedral until last March. No doubt some of you, or may it be many of you, are well acquainted with, and have been allowed to study, this glorious example; and those who have that pleasure to come will have heard of,—or may have even in passing through the town on one of those delightful preliminary tours of sight-seeing before deciding at which place to settle down for serious work,—gazed up with wonder and astonishment at this choir of choirs,—spun like a cob-web in the air,—so that you will understand the difficulties, or rather impossibilities, of doing justice to so grand an edifice, either by drawing or description, in so short a period. Still, with vain and foolish calculations, I had hoped to finish a part of the apse by now, but practice soon showed me the absurdity of my speculation, so that I have broken the thread of my work for a few days, to show and tell you the little that I as yet know of Beauvais, and that I may return with the information that you can give me on the subject, wiser than I came.

About 991, Hervée, fortieth Bishop of Beauvais, laid the foundation of a cathedral dedicated to St. Pierre, which his successor, Roger de Champagne, continued. But in 1180 this edifice became the prey of the flames.

In 1225, Bishop Milon de Nanteuil, with the aid of the chapter, undertook the building of the present cathedral. The apse and choir, properly speaking, were commenced in 1247, and were completed October 31, 1272. It is thought that Eudes de Montreuil, architect to St. Louis, designed the choir. But, alas! this choir was built with insufficient funds, and with indifferent material, both as to quality and size, and on November 29, 1284,—but twelve years after its completion,—a large part of the vault fell in, causing so much damage that for forty years no offices were held in the cathedral. In 1337, Bishop Jean de Mavigny and his chapter desired to finish the choir, and chose as architect Enguerand le Riche, and it was then found necessary to subdivide the large bays on either side of the choir (the total length of which measures 84 ft. from the centre of the first pier to the centre of the fourth) by placing intermediate piers, and the apices of the semi-arches carried by these piers were blended into the then existing arch; the intermediate pier was carried up, dividing the original width of clearstory and triforium into two parts, and supported a new vaulting-rib, thus converting the quadripartite vaulting into hexapartite; in like manner, the vaulting of two of the bays on the north side and two of the bays on the south side of the choir-aisle was converted to hexapartite, the extra rib on the outside being carried by an intermediate pier, subdividing the corresponding large bay of the side aisle arcade. After this was done the work at the cathedral was stopped for over a century by various wars, and was not resumed until the 21st of May, in the year 1500, when Bishop Villiers de Isle-Adam laid the foundations to the transepts, the northern façade of which, being partly constructed at the expense of François I., was completed in 1537, and was executed from the designs of Martin Cambiche de Paris. The southern transept was executed from designs of the architect Michel Lalge, and was completed in 1548. But now, instead of continuing the nave, one bay of which had been started, the architect, Jean Vast, who succeeded Lalge, constructed on the piers of the crossing a gigantic flèche, 303 ft. above the apex of the vaulting, or 462 ft. above the transept-floor (this does not include the height of the cross at the apex of the flèche). It was pierced, forming a lantern, two-thirds of its height, but the piers, receiving no support from the nave, gave way, and this great spire fell but five years after its completion, on the 30th of April, 1573, at seven in the morning, on Ascension Day, just as the procession had left the Cathedral for the town, and this new disaster was not entirely repaired until 1576.

Thus we see Beauvais met with much misfortune. And now the apse, with its chapels, and the north and south side chapels to the choir, the columns to the three large bays of the choir, and the eastern aisles to the transepts form very nearly the entire remnants of the original structure. Let us first consider in the design of this cathedral the harmonious relations between the whole and its parts.

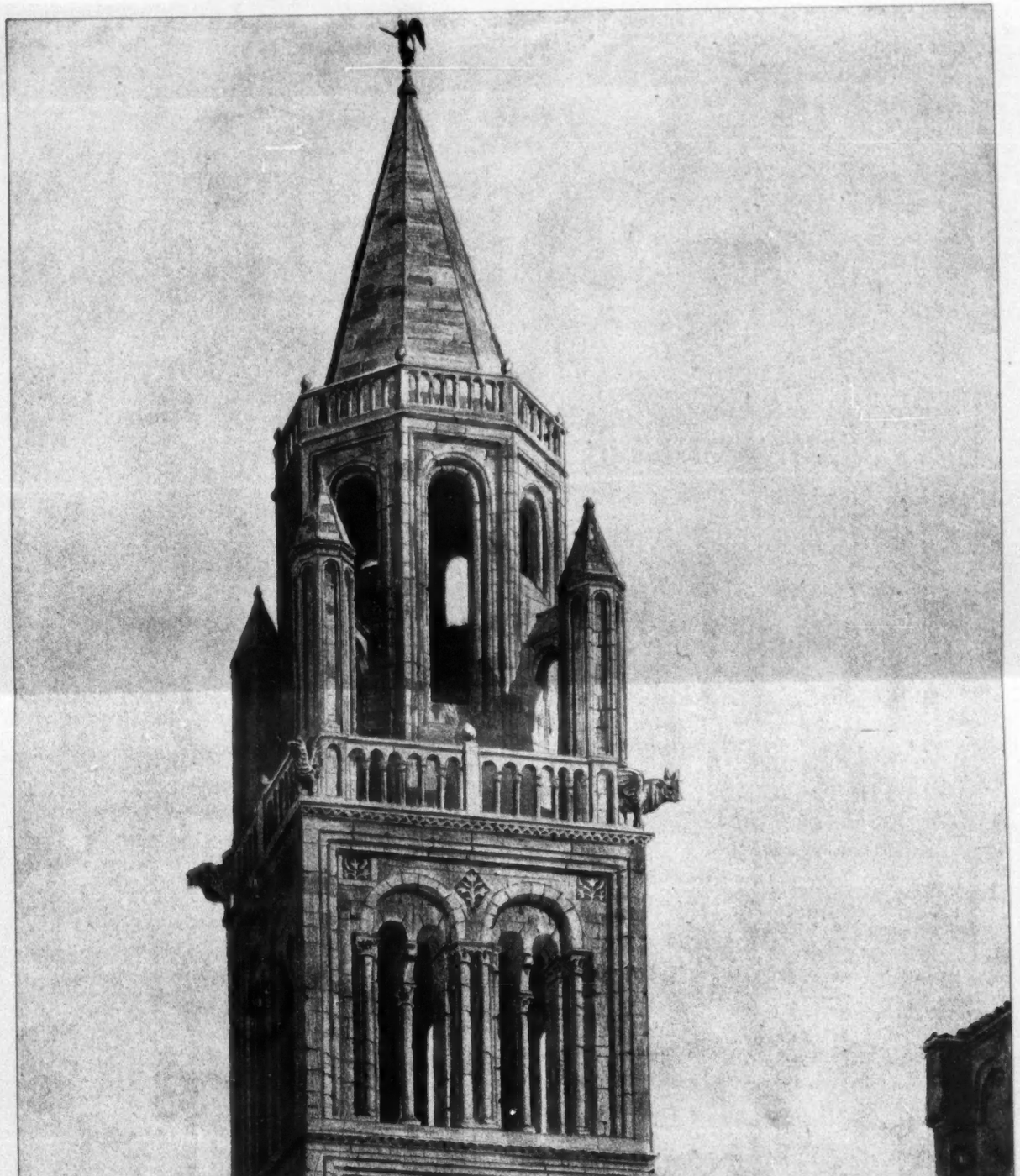
Here is a plan of the choir at Beauvais, the axis being at A. First of all the axes of the principal pillars which support the principal nave were fixed at 50 ft. distance from each other. At a point *a* taken in one of these axes, a line *a b* was drawn at an angle of 60 deg., giving at its intersection with the other axis the point *b*, the centre of a pillar like the point *a*. Drawing from the point *b* a line perpendicular to the axis, we obtain a point of intersection *c*, the centre of a third pillar. In this way the centres of the pillars have been arrived at. Still proceeding in the same way, and extending the lines inclined at 60 deg., a series of equilateral triangles is obtained, whose apexes give the line C of the intermediate pillars of the double aisle, and the exterior plain D of the side of the lower aisle. The diameters of the cores of the pillars of the central nave were fixed at 4 ft. 7 in., those of the intermediate pillars at 4 ft. 7 in. also, the thickness of the wall D at 5 ft. 3 in. Thus we have arrived at the axis, the distance between the pillars, and the width of the aisle, and we see that the distance between three of the pillars of the choir are equal, but also that these distances extend to more than half the span of the choir; for the axes of the pillars *a* and *c* are distant more than half the direct distance between the axes *c b*, whilst the axes of these pillars, *a* and *c*, are distant from each other one-half of the diagonal *a b*. There is thus both relation and dissimilarity, and this, as M. Violllet-le-Duc says, is one of the conditions of harmony from an architectural point of view, to avoid the apparent succession of equal divisions, but at the same time to have proper relations existing between them. In the same way, the distance been *a* and *d* is less than the distance *a c*, but this distance is equal to half the distance between axes *a e*. The space *d f* is smaller than the space *a d*, so that in a longitudinal direction the bays are similar; in a lateral they are dissimilar, and decrease towards the sides, which is, moreover, in conformity with the rules of stability.

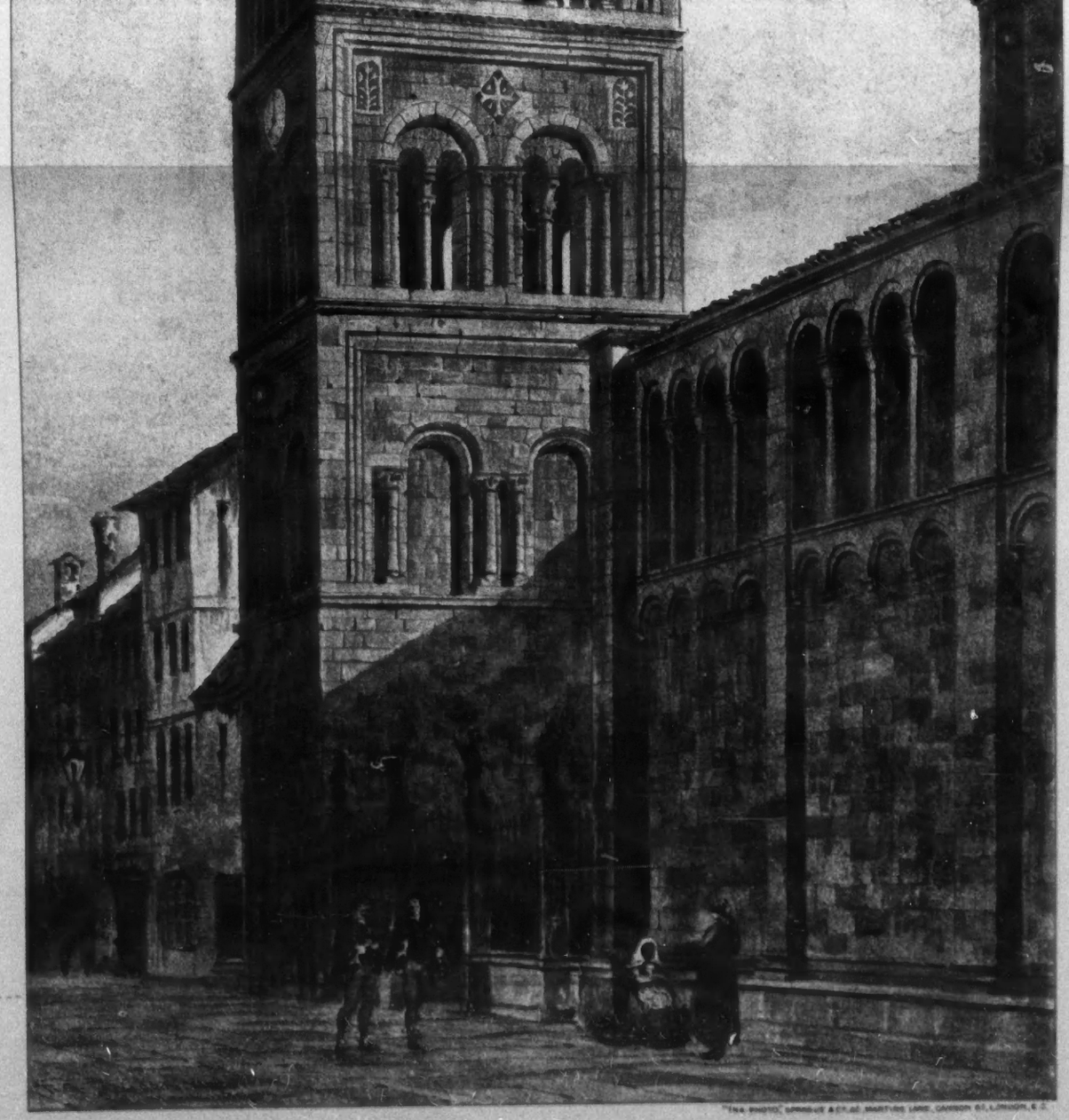
But this choir opens into the transept equal in width to the principal nave. The architect saw that the great archivolts received by the pillars *a c* would exercise an active pressure upon the first pillar, *g*, of the choir, which is no longer propped at the height of these archivaults. First of all he increased the area of this column; then he decreased the space of the first bay, B.

At G, the architect intended to erect a tower over the bay of the transept, and therefore

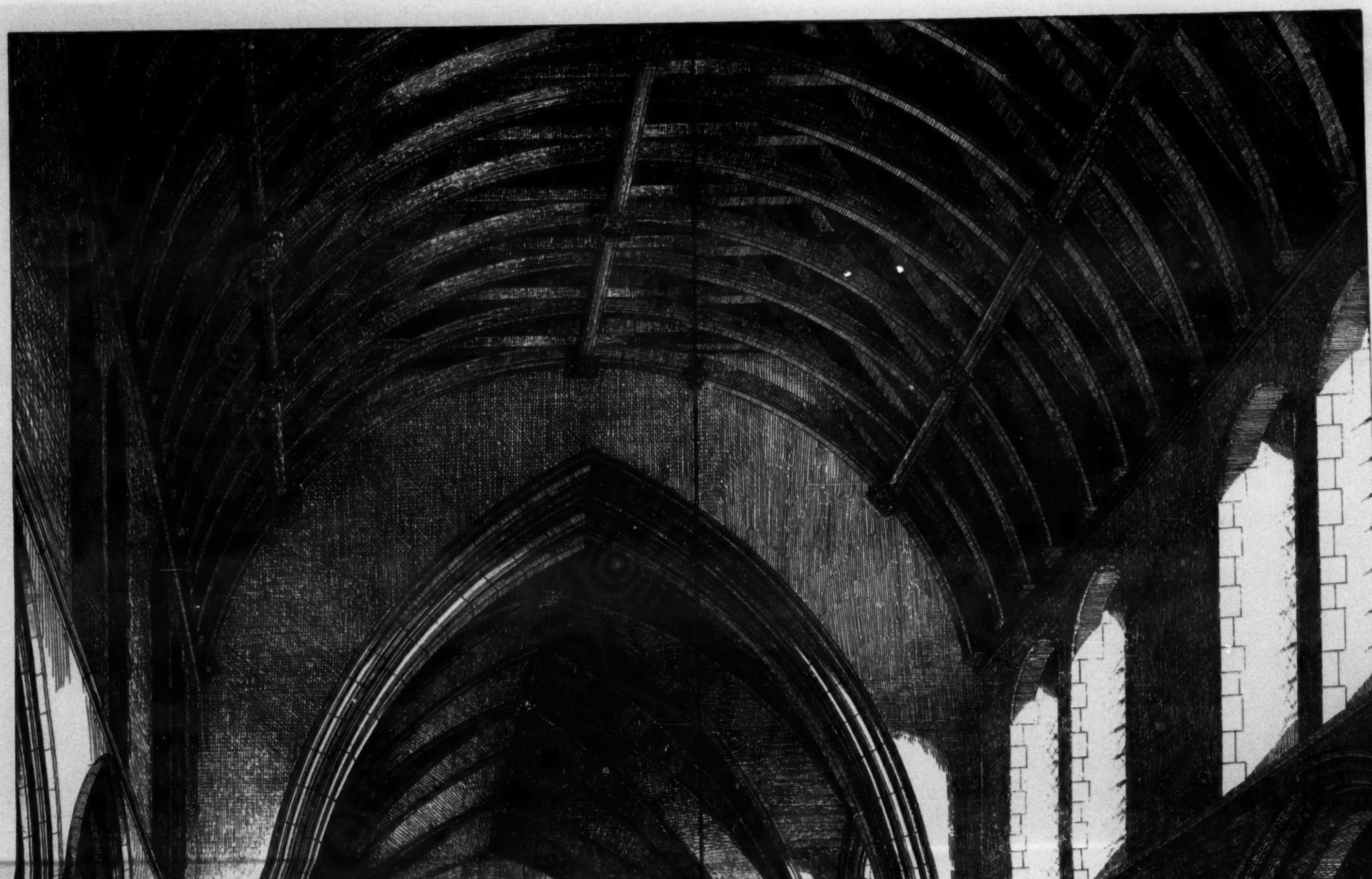
* A paper by Mr. D. J. Blow, Travelling Student of the Architectural Association, read by him at the meeting of that body on the 17th inst., as elsewhere mentioned.

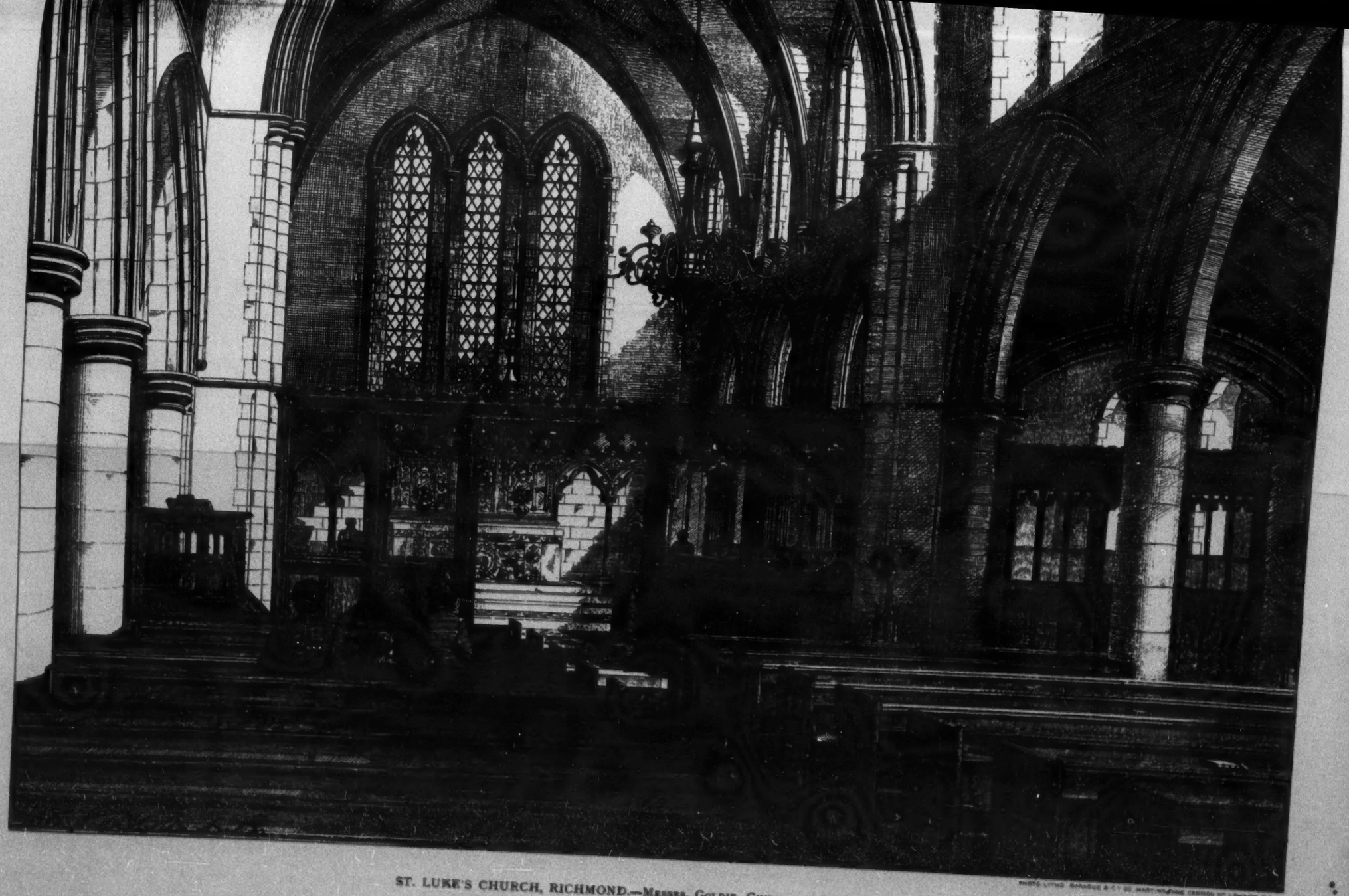
THE BUILDER, MAY 25, 1889.





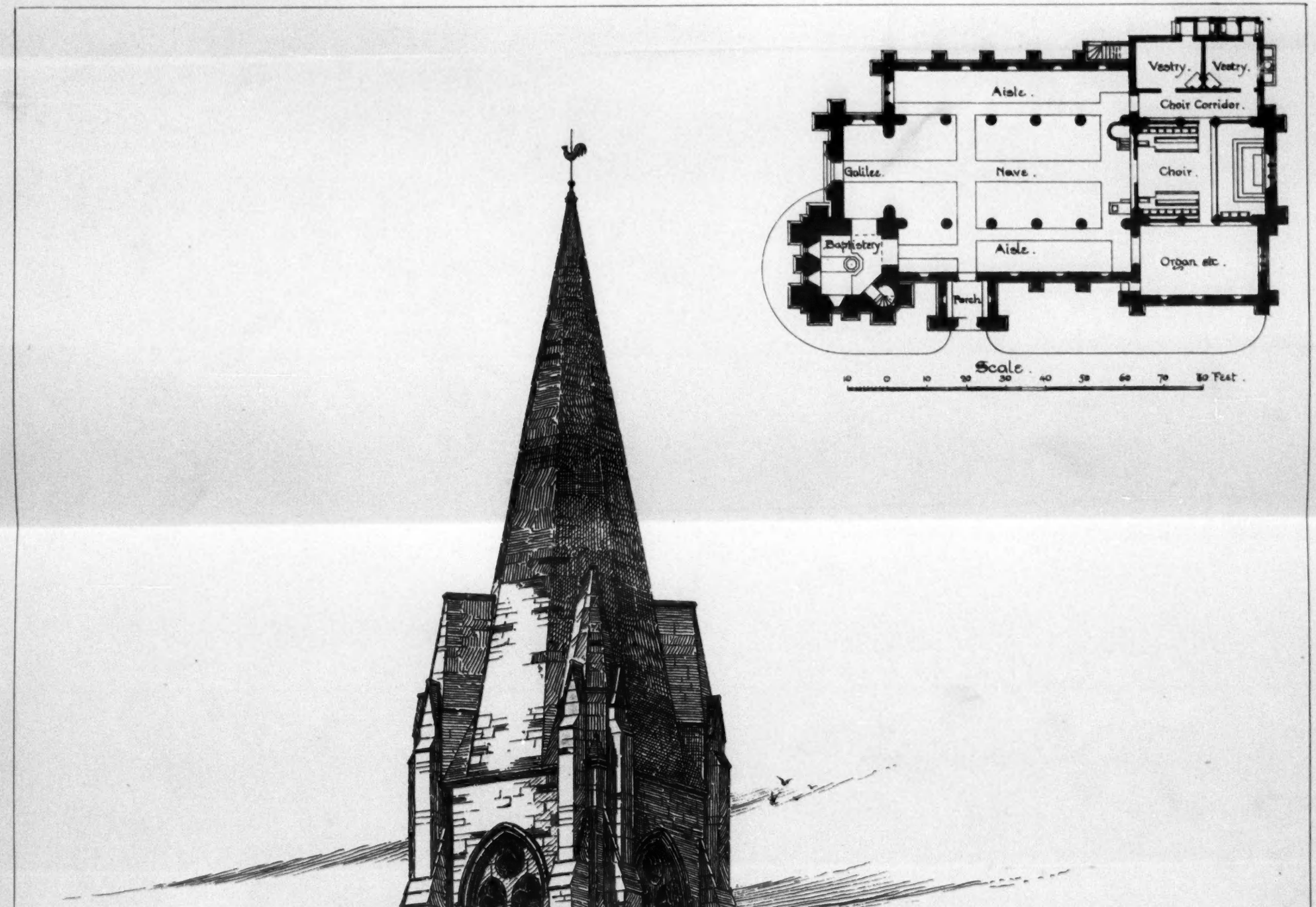
DESIGN FOR COMPLETION OF CAMPANILE, ZARA, DALMATIA.—Mr. T. G. Jackson, M.A., Architect.





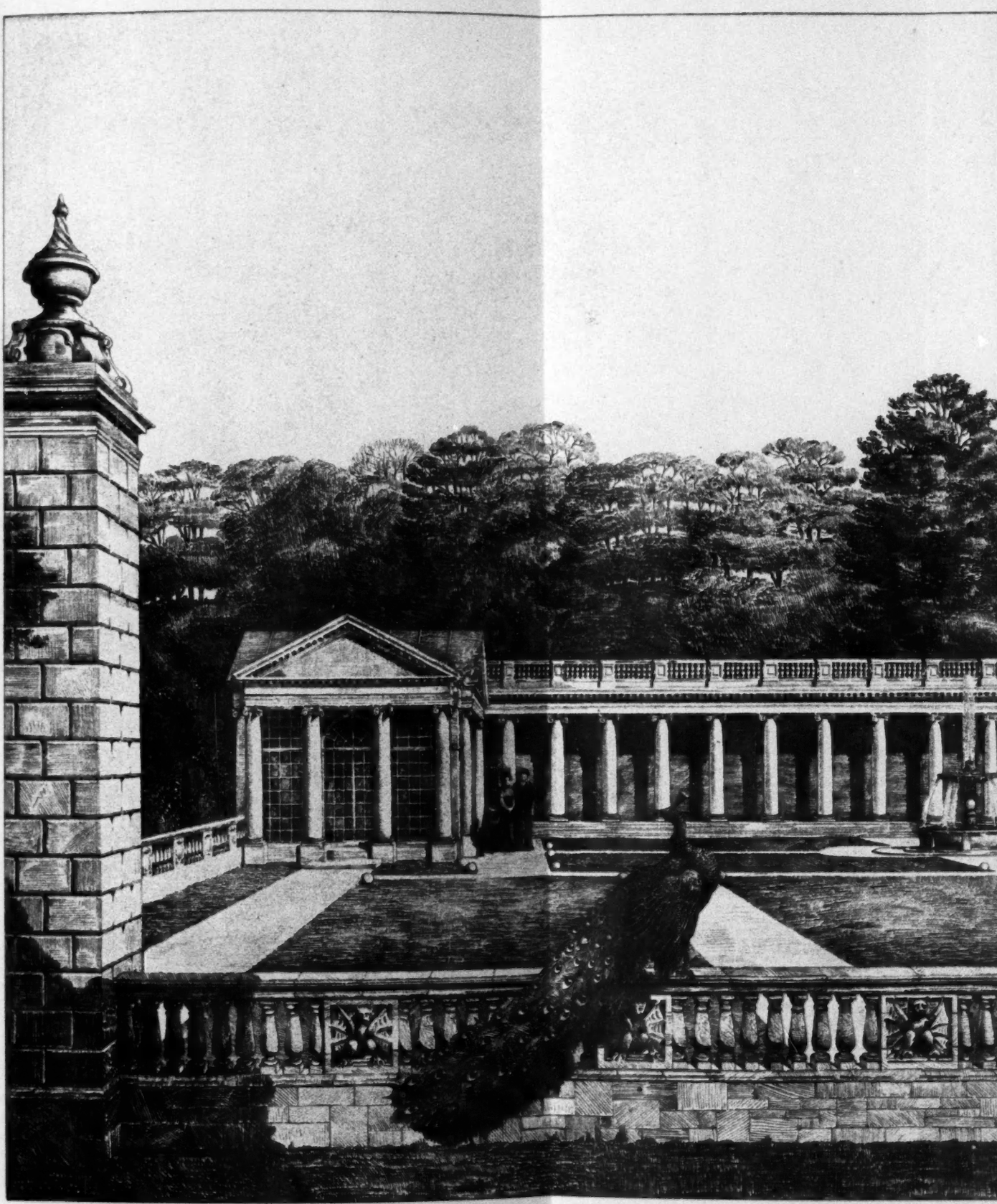
ST. LUKE'S CHURCH, RICHMOND.—Messrs. Goldie, Child, and Goldie, Architects.

INTERIOR VIEW.

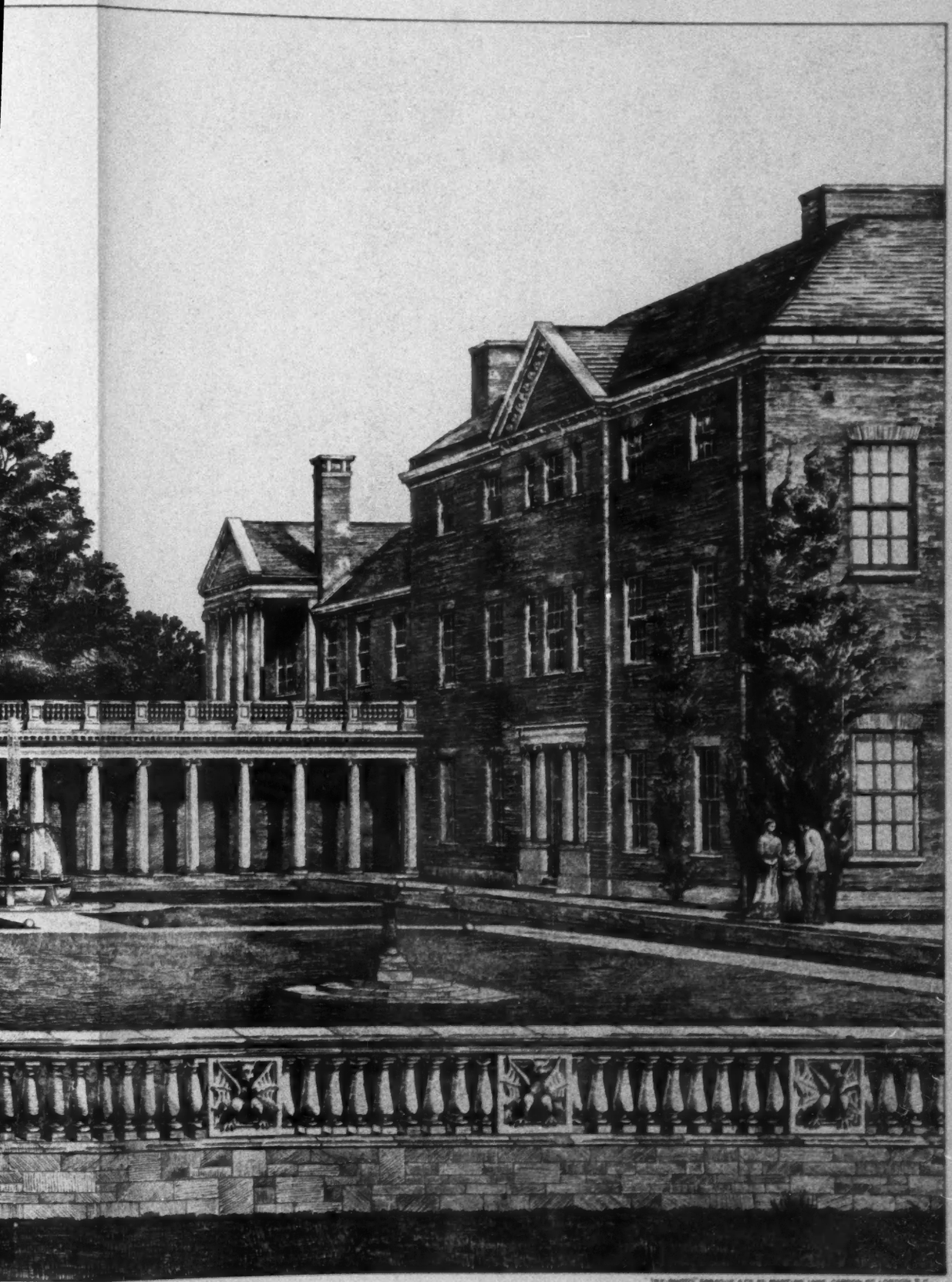

Vestry.
Vestry.
Aisle.
Choir Corridor.
Choir.
Galilee.
Nave.
Baptistery.
Aisle.
Organ etc.
Porch.
Scale.
10 0 10 20 30 40 50 60 70 80 Feet.

ST. LUKE'S CHURCH, RICHMOND.—Messrs. Goldie, Child, and Goldie, Architects.

EXTERIOR VIEW.



HATCHLANDS, SURREY.—Mr. Halsey



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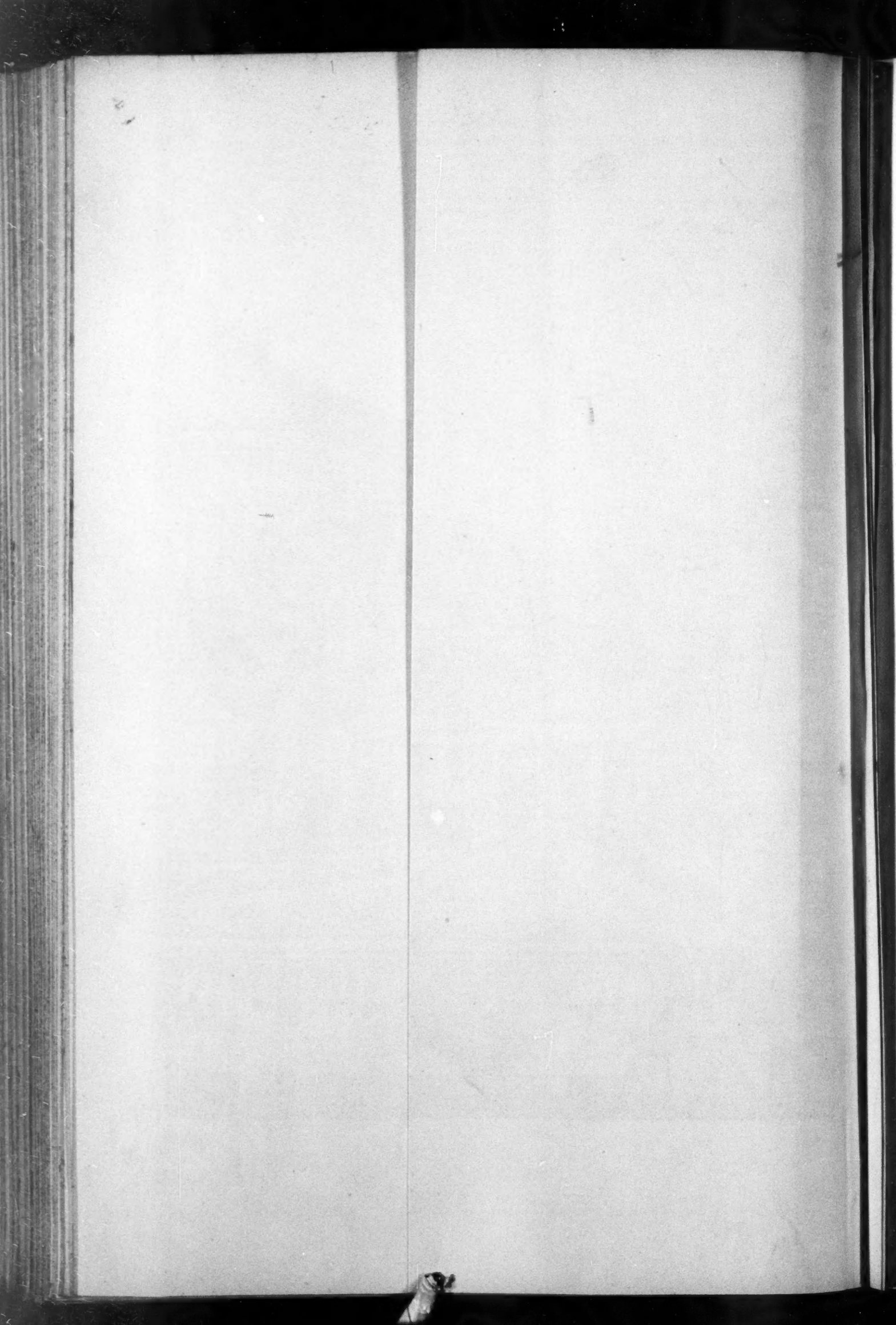
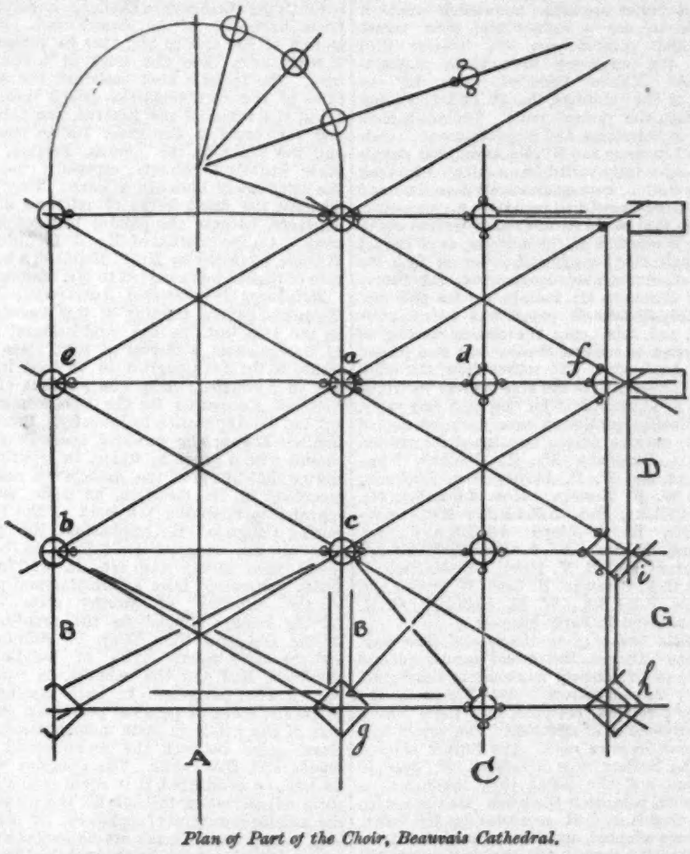
LSEY RICARDO, ARCHITECT.



strengthened the pillars *h* and *i*, as shown in the drawing.

Thus we see some of the relations existing between the axes and outlines of the plan, which we will find are again in harmonious relation with the elevation. Taking the base *c a* in elevation, and constructing on the base formed between the axes of the pillars a number of equilateral triangles, forming a series of lozenges, the apex *a* gives the height of the spring of the archivolts of the aisles; the apex *b* of the triangles, whose base is taken at the height of the astragals of the small engaged shafts, gives

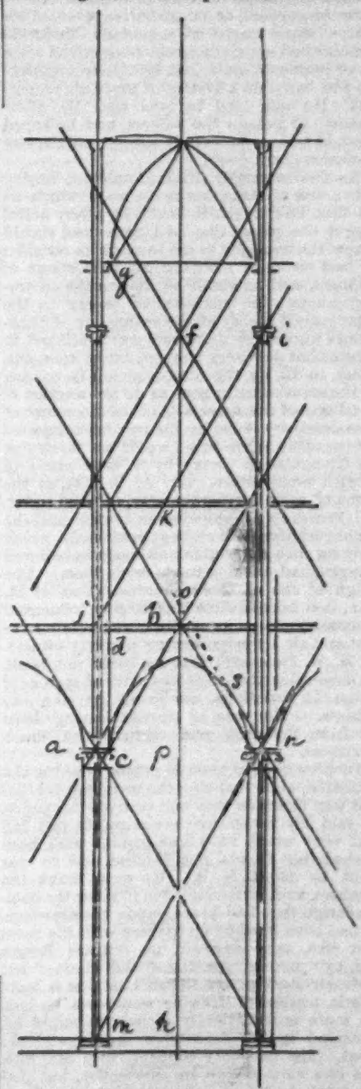


Plan of Part of the Choir, Beauvais Cathedral.

the height of the lower string-course of the triforium; the intersection of the vertical lines *d* with the sides of the triangles gives the height of the upper string-course of the triforium; the apex *f* gives the height of the spring of the grand vaults; and the points of intersection *g* give the height of the spring of the wall arches. It results from this sketch that the height *h p* equals the width of the grand nave between the axes of the pillars; that the height *b k* of the triforium equals the height *p b*; that the height *b f* equals the height *h p*, or the width of the nave between axes. It will follow equally that the line *m n*, is equal to the base of the triangle; that is to say, to the distance between the axes of the pillars in couples of the bays, which gives an appearance of stability to the pillar, which is braced, so to speak, by imaginary sides, which the eye pictures without being aware of it; that the extension of these sides are tangential to the archivaults at *s*; that in the same way the capitals which carry the principal vaulting arches are braced by the sides, *j i*; thus we see what beautiful harmonious relations exist between the elevation and plan. I would also say that the profile of the mouldings to bases and others are drawn to an outline of an angle of 60 deg.

Mr. A. B. Pite, in moving a vote of thanks to Mr. Blow, said he did not think there was anything to be gained by the triangulation theory which Mr. Blow, evidently inspired by M. Viollet-le-Duc, had taken up. At one time he (the speaker) thought there was something in that theory, but after testing it he had come to a different conclusion. While he could not help admiring the courage of a Travelling Student in taking up that theory, and endeavouring to work it out with reference to the beautiful architecture of Beauvais Cathedral, he was not fond of turning architectural into geometrical or mathematical problems, finishing up with "Q. E. D." In his experience any attempt of the kind usually ended in a *reductio ad absurdum*. A notable feature in Beauvais Cathedral was the kind of clearstory over the aisle which ran round the *chevet*, beautifully illustrated in Burges's book of architectural drawings. He would recommend any student who wanted to send in a drawing as candidate for probationer at the Royal Academy to copy Burges's drawings of Beauvais. The Cathedral of Beauvais was one of the loftiest in France,—*the* loftiest, he thought, excepting Bourges. Its appearance of shortness was no doubt due to its great height. He remembered that the late Mr. Street, in his Royal Academy lectures, spoke rather dubiously about the craving for height which was manifested by the builders of the French cathedrals. The builders of Amiens, Reims, Beauvais, and Bourges all seemed to make it their one object to carry their buildings up to the sky. The effect of these lofty buildings, internally, was not satisfactory. Mr. Street stated that he happened to be one day in Amiens Cathedral, and the next day he was in Exeter Cathedral. Although Exeter Cathedral was a comparatively low, dumpy-looking building, probably hardly one-third the height of Beauvais, Mr. Street declared that the internal effect at Exeter was perfect in its quality of proportion. The long aspiring lines of the vaulting-shafts of the choir at Beauvais seemed to have the appearance of bulging inwards half way up, owing, no doubt, to the absence of an entasis. He (the speaker), when he was at Beauvais, went up on the leads and around the gutters, and the number of tie-rods to be seen holding the buttresses together was alarming. They were evidently put in at the time of the construction of the work, and if they were really necessary, the work ought never to have been built. In conclusion, Mr. Pite warmly complimented Mr. Blow upon his drawings, which had evidently been made *con amore*. He had been trying to sketch in pencil without showing the hard lines, and in that matter he had set an example worth attention by them all (applause).

Mr. A Needham Wilson said he had been greatly delighted with the paper which Mr. Blow had read. Notwithstanding what Mr. Pite had said, he (the speaker) thought that there was something to be said in favour of the triangulation theory. If there was ever a man in this world against whom Mr. Pite ought not to say a word it was Albert Dürer,—(laughter),—but Albert Dürer was strongly of opinion, and followed up his opinion by his practice, that the human figure, and even portions of the human



figure, should be drawn on the basis of a system of triangles. Seeing that the results of that geometrical method had been the production of such marvellous works as Albert Dürer had left us, he thought it would perhaps be as well for them all to study geometry a little more than they did (hear, hear).

Mr. Baker commended Mr. Blow for the very excellent full-sized sections of mouldings which he exhibited on the screen, and told an amusing story about the late Sir Gilbert Scott's enthusiasm on the subject of mouldings.

Mr. A. H. Hart, as a former Association Travelling Student, said he thought Mr. Blow had done well to confine his attention to one great building, and to work at it thoroughly. He believed that that course was the best to pursue (hear, hear).

Mr. Owen Fleming said that with regard to the triangulation theory, there was to be seen at Louvain an actual drawing from which a Mediæval church had been built, but it was without any triangles or squares or any other geometrical figures, and was, in fact, a mere rough sketch such as a mason might make. He was very sceptical about the triangulation theory, believing that those instances to which it seemed to apply were mere coincidences. At any rate, he was thinking some day of taking a modern design which he knew had not been based on triangles, and seeing how the theory could be applied to it (laughter).

Mr. H. O. Cresswell said he, too, thought Mr.

Blow had done well to confine his attention to the measuring and study of one particular building. As to the vexed question of triangulation, he did not think it was possible to find out whether the old buildings were designed on such a basis or not. It was a favourite theory of the late Viollet-le-Duc that they were designed in that way, and that distinguished architectural writer had given a great deal of matter in support, or in partial support, of his theory. Many parts of important Mediæval buildings had apparently been designed on some sort of harmonic scale, just as Classic architecture was based on a system of harmonic proportions. He was glad to hear that Mr. Blow intended to pursue the subject, and he hoped he would be able to work it out to a satisfactory conclusion (hear, hear).

The Chairman (Mr. H. D. Appleton) having made a few remarks, in the course of which he said that he thought it would be a very useful thing if the paper that had been read should induce the members to set to work to consider the best means of studying the proportions of buildings, and in which he likened the controversy about the triangulation theory to the cryptogramic theory of the authorship of Shakspeare's works, the discussion was continued in a somewhat desultory manner, being spun-out, in fact, to fill up the time occupied in waiting for the scrutineers' report as to the election of the officers of the Association. In the course of these desultory remarks, one member suggested that possibly some light would be thrown on the triangulation theory by a close study of Moorish architecture. Mr. A. B. Pite, in the course of some further remarks, referred to Mr. J. L. Pearson's six churches in London and the neighbourhood as buildings eminently worth study for their proportions, although he believed triangles had nothing to do with them. The design of one of those churches (that of St. John, Red Lion-square) was largely influenced by considerations connected with claims to light and air by neighbouring property-owners. Mr. H. W. Pratt said that he could not resist the conclusion that some geometrical system of design in buildings was used by the old builders. The vote of thanks having been put from the chair and carried with much heartiness,

Mr. Blow replied to some points raised in the discussion, after thanking the members for the kind way in which they had received his paper. He said his notes were less complete and full than they would have been had his work been finished, but it was not finished, and he was about to return to it. He must thank the members, and particularly Mr. Pite, for the commendation they had passed upon his drawings. He had been brought up to draw with the usual hard line, only admired, as William Burges said, by "parents, guardians, and idiots;" but Professor Ruskin had shown him that a more artistic method of drawing would not be less, but more architecturally correct, as might be, witnessed in the inimitable drawings of old Prout. He not only thought, with Mr. Pite, that one must design in perspective, but that one must design in light-and-shade also (hear, hear). One could not design in light and shade until one had learnt to draw in light and shade (hear, hear). How one could almost read Prout's drawings, feel their age, and measure the very heights, depths, and distances of his buildings, from the artistic feeling and value of every line! With regard to sketching, he advised his fellow students not to content themselves with sketching only architecture. Let them occasionally go to nature and draw a leaf or a flower; they would be all the better for it, and would put more real feeling into their work. How often did they see designs for foliated capitals, &c., got out in architects' offices without the slightest knowledge of what the actual natural leaf was like! With regard to the tie-rods at Beauvais Cathedral, M. Viollet-le-Duc had said distinctly that the tie-rods of the buttresses were at first meant to be of only temporary service; but the building was very hurriedly run up, the builders seeking to emulate those of Amiens in regard to speed. The local stone, though it had become hard with exposure, was, when first quarried, a very poor material, obtainable only in small pieces, and it was not thought expedient to remove the tie-rods: they were therefore left, and had remained ever since. In conclusion, Mr. Blow said he did not believe that our forefathers could have produced the magnificent structures they had left us had they not studied the harmonious relations of all parts of their buildings.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—At a well-attended meeting of this Association, held on Tuesday last, Mr. W. H. Bidlake, M.A., A.R.I.B.A., read a paper entitled "Buttresses, their History, Theory, and Design." The paper was illustrated by some diagrams and a large number of very admirable drawings, the former showing the mechanical forces to which buttresses are subjected, the latter being excellent examples of their history and design. Mr. Bidlake dealt with the history of buttresses from the earlier times, when mass of material gave the necessary strength, to the latter days, when a better scientific knowledge made it possible to use a lighter and more ornate form, and pointed out the honesty with which the buttresses were made throughout the Middle Ages of value in the design of the buildings, though evidently props to sustain the vaulted roofs. The mechanical theory of buttresses, and its government of their external forms in the Middle Ages, with details of the constantly-varied forms adopted for their ornamentation, were exhaustively described, and Mr. Bidlake closed his paper by a comparison showing that in the decadence of Gothic architecture it was true of the buttress, as of the art as a whole, that constructed ornament took the place of ornamented construction. A hearty vote of thanks to Mr. Bidlake for his able and admirably-illustrated paper was unanimously passed, and, this being the closing meeting of the session, a vote of thanks was also passed to Mr. Doubleday, who retires from the office of vice-president, for the able manner in which he had filled that office for the past two years. The following gentlemen were declared elected for the various offices mentioned for session 1889-90:—President, Mr. T. Naden; Vice-President, Mr. W. H. Lloyd; Hon. Treasurer, Mr. T. W. F. Newton; Hon. Librarian, Mr. W. H. Bidlake, M.A., A.R.I.B.A.; Hon. Secretary, Mr. H. R. Lloyd, A.R.I.B.A.; Hon. Auditors, Messrs. A. T. Powell, Chartered Accountant, and B. V. Hirst. Committee:—Messrs. C. E. Bateman, H. Beck, W. Doubleday, W. Hale, F.R.I.B.A., W. H. Kendrick, H. H. McConnal, and F. Barry Peacock.

Sheffield Society of Architects and Surveyors.—On the 14th inst., the second annual general meeting of this Society was held in the School of Art, Arundel-street. Mr. Flockton, the retiring president, presided, and there was a large attendance of members. The report and balance-sheet were read. The former showed that the Society now consisted of over 70 members, and the latter that there was a substantial balance in the bank. On the motion of Mr. Davidson, C. E., seconded by Mr. Smith, both were adopted, and it was decided to print and circulate them. On the motion of Mr. Smith, a hearty vote of thanks to the retiring officers was agreed to, Mr. Smith especially eulogising the services of Mr. Flockton, who, according to rule, now retires from the chair. Mr. Flockton spoke of the great satisfaction he had received at the state of their society on the close of his two years of office. He should look back on them with great pleasure, and he believed the work that was being done would greatly benefit their profession, and give it increased status in the public opinion of their fellow-townsmen. A ballot then took place, Messrs. Benton and W. C. Fenton being appointed scrutineers. The following gentlemen were elected for the season 1889-90:—Mr. Frederick Fowler, President; Mr. C. J. Innocent, Vice-President; Mr. J. B. Mitchell-Withers, Treasurer; and Mr. C. Hadfield, Hon. Secretary. Messrs. T. J. Flockton, W. F. Hemsoll, E. M. Gibbs, J. D. Webster, and Ed. Holmes were elected Members of Council. At the close of the general meeting the Vice-President, Mr. C. J. Innocent, took the chair, and introduced Mr. H. Stannus, F.R.I.B.A., of London, who delivered an interesting lecture on "Storiation in Architecture." The lecturer pointed out that all great works of art, literature, poetry, music, and the like, had a central idea permeating and linking them together. Storiation was really the art of making architecture interesting and pleasing. The lecturer went through the history of the arts from the earliest attempts of barbarians and savages,—who, he said, like young children, naturally preferred to draw living objects, such as men, animals, and the like,—to the works of the Egyptians, Assyrians, Greeks, and Romans, of the Early and Middle Ages, and the Renaissance, down to the present day. He gave the chief characteristics of the different periods, and showed how the arts, and especially architecture, told the story and characteristics of a people. In the days before printing art was didactic. The churches and other buildings were the poor man's books. From these he learned his scripture history and religion. The lecturer urged on his hearers (especially architects) to try and never miss an opportunity of inducing their clients to spare money for a work of art, sculpture, or painting. This might often be done by not over-ornamenting buildings with unmeaning design. He instanced the work of a clever Sheffield sculptor, Creswick, on the Hall of the Cutlers' Company in London,—a sculptured frieze illustrative of the cutler's craft. It was so true to life and so real that he recognised it must have been the work of a Sheffield man. The lecturer next described the sculptures of the Parthenon, the Greek vases and coins, the works of the Romans, the painting and sculptures of the great Italian masters, and the works of the French, Belgian, and other historical painters, especially noticing the paintings of Flandrin in Paris. They were amongst the finest works of religious art in existence, because the painter believed in his work. On the motion of Mr. J. B. Mitchell-Withers, seconded by Mr. C. Hadfield, a hearty vote of thanks was awarded to Mr. Stannus.

Edinburgh Architectural Association.—After the annual general meeting of this Association on the 16th inst., in the Architectural Hall, 42, George-street, a discussion took place with regard to the Art Congress to be held in the city in November, under the auspices of the National Association for the Advancement of Art and its Application to Industry. Professor Baldwin Brown, who presided, opened the discussion with a paper in which, in addition to stating the objects of the Association and the procedure of its meetings, he made several suggestions regarding the work of the forthcoming Congress. He emphasised the point that an art congress could have no better theme than aiding the arts in working in union, particularly from an architectural point, in the direction of worthy civic work. Having briefly alluded to the architecture of the Old and New Town of Edinburgh, and the more recent styles of building in the West End and the suburbs, he said we wanted more patriotism in such matters,—a quickened sense of personal possession on the part of the public in civic monuments, and a closer union between the architectural profession and the public. The Congress would do well, he considered, if it could send a fresh thrill of animation through all the classes of the artistic community (applause). If it could help in any way to make art no longer a mere luxury, but a language, he thought the Congress would not have been held in vain (applause). He urged that it would be better for the Congress to take up a few subjects, and deal with them thoroughly, than to take up many subjects which would only be slightly touched; and, further, that in order to make the proceedings generally valuable, craftsmen should be allowed to share in the deliberations. He added that he might say that the Congress was bound to be a success of a certain kind, in the way of attendance, and in the number and individual quality of the papers. To make the success lasting, they must assert their position as representatives of important art centres in Scotland. Above all, they must not let the Congress degenerate into a mere social function, or a Babel of empty talk, or an exercise ground for airing worn-out artistic fads (applause). Dr. Rowand Anderson suggested that there might be formed a collection of plans and views of the city of Edinburgh for the inspection of visitors at the Congress. There was, he said, a very large collection in the possession of the Board of Manufactures, and he had no doubt they would put them at their service. In the hands of individuals, also, there were many interesting views of Edinburgh and its buildings. Mr. G. Aitken pointed out that the Congress might discuss the subject of how art could be countenanced in schools. He regarded the subject as of importance, inasmuch as the young would be taught to form for after-use ideas regarding art in various forms. Mr. D. J. Vallance spoke of the desirableness of arranging meetings in the evening for the benefit of art-workmen throughout the city. Dr. Haycraft pointed out that arrangements might be made for visits in the afternoons to prominent places of architecture, and to pos-

sibly the art studios. Mr. Mavor, Glasgow, said he was sure many people in Glasgow were prepared to take a warm interest in the Congress, and there would be present a very strong contingent of them. He thought that the success of the Congress would depend very much upon the manner in which the programme was drawn up. A good deal of conversation also took place with regard to the duties of the Architectural Sectional Committee, Dr. Rowand Anderson, who is the convener of the section, bringing the subject before the meeting. It was indicated by the Chairman that the subject was, in the first instance, one for the General Committee, and he stated that a meeting would shortly be held to further the preliminary arrangements.—On Saturday afternoon last the members of the Association, to the number of about fifty, paid a visit to Arniston House and Temple Church. At Arniston House, where the party was received in Mr. Dundas's absence by Mr. Cook, the steward, Mr. David MacGibbon acted as leader. The fine natural advantages of the valley of the Esk had all been rendered available in connexion with the site of the mansion-house, but what specially called for attention was the result of the foresight of the proprietor and of the artist—Mr. Wm. Adam—who guided him in laying out the park in 1726, at which time also the same artist prepared the plans of the mansion. The edifice showed the arrangement, common at that period, of a central block containing the principal apartments, and two wings, in which were situate, on opposite sides, the kitchen and stable offices. The wings were originally joined to the central block by corridors, which, however, being found inconvenient, were altered to two stories in height. The kitchen is about 100 ft. from the dining-room, and in order to avoid the constant running backward and forward of the servants, a small railway had been laid down from the kitchen to the service-room, and dinner was brought up on miniature trucks driven by a windlass. After a short stay at Arniston House, the party continued their walk through the policies and up the valley to Temple Church, where they were received by the Rev. J. W. Blake, the minister of the parish. Mr. Archibald Macpherson, who took Mr. MacGibbon's place as leader, explained that the small rural church, roofless and ruinous as they now saw it, was all that remained to indicate the seat of the preceptory—the headquarters in Scotland—of the Templars. The building as it now stood could not, however, be attributed to the time of the settlement of the Templars in that place, which was the twelfth century, because the detail generally was that of the following century, and it was conjectured that the Knights of St. John had more to do with the architecture of the church than their predecessors. Before the erection of the present parish church, and for two hundred years and more, the building was occupied as the parish church.

CASE UNDER THE METROPOLITAN BUILDING ACT.

WOODEN STRUCTURES.

MESSRS. CURRY & SHREEVE, timber merchants, of Hardcastle-street, Peckham, were summoned on the 16th inst., at the Lambeth Police Court, before Mr. Partridge (the sitting magistrate), by Mr. Henry Jarvis, District Surveyor, of St. Giles's, Camberwell, for having erected on their premises a shed building, open at the sides, the roof being constructed of combustible material and supported with framed woodwork, without having given two days' notice to such Surveyor as required by the 38th and subsequent sections of the Metropolitan Building Act, 1855.

The presiding magistrate, on the evidence given, and after examining the drawing produced by the District Surveyor, held that the erection was a building within the meaning of the Act, and thereupon ordered the defendants to pay a fine of 5*l.* 5*s.*, and allowed 23*s.* costs in the case.

The Institute Council Election.—A good many members of the Institute have probably received a lithographed letter in regard to the list of names nominated as Members of Council, in the course of which it is stated that "one of the architects nominated among the Fellows has not even yet been elected a Fellow." We are authoritatively informed that this is a mistake: the fact is not so.

Recent Patents.—Our list for this week is held over for want of space.

THE LONDON COUNTY COUNCIL.

AT the ordinary weekly meeting of the London County Council, held on Tuesday last in the Council Chamber, Guildhall, Lord Rosebery, the Chairman, read a letter from the Town Clerk (Sir J. B. Monckton) stating that the Court of Common Council had unanimously agreed to comply with the request of the County Council for the use of the Guildhall for a further period of three months, but pointing out that beyond August 7 next the permission could not be extended, as the Guildhall would be in the hands of workmen to effect necessary alterations. It was agreed that the thanks of the Council be conveyed to the Corporation for their courtesy. Thanks were voted to the Corporation for their courtesy in the matter, and the Chairman directed the special attention of the Council Chamber and Offices Committee to the intimation contained in Sir J. B. Monckton's letter.

Cost of New Improvements.—The Finance Committee recommended that under certain conditions 6,000*l.* be lent to the Poplar District Board for an approach to Bromley-bridge, and 4,066*l.* to the Guardians of St. Saviour's Union, for alterations, additions, and drainage and cooking and heating apparatus at Newington Workhouse. Lord Hobhouse moved as an amendment,

"That, except in the case of applications already entertained, or under other special circumstances to be reported to the Council, no applications for new loans shall be sanctioned by the Council until Parliament has declared that the burden of such new loans shall be borne in such manner as Parliament shall decide with reference to local taxation in London."

After a long discussion, this amendment was rejected by 68 votes to 39.

Gates and Bars in London.—The Highways Committee recommended

"That it be referred to the Parliamentary Committee to take steps to obtain the necessary powers for the Council to remove all bars, gates, and other obstructions now existing in the London streets and thoroughfares."

Mr. Haggis, in moving the adoption of the report, stated that the Committee were unanimous that the time had come when a determined effort should be made to remove these obstructions, of which there were about 230 within the metropolitan area. In many cases they had existed since the beginning of the century. At that time, perhaps, no inconvenience arose from them, but they were not to be tolerated in this busy age, as they caused enormous loss in business. London had spent millions in street improvements, and in opening up communications, and yet these thoroughfares remained useless to the public. He maintained that the obstructions ought to have been abolished in 1855, when London government was consolidated. Spasmodific efforts had been made for upwards of twenty years to get rid of these obstructions by Vestries and District Boards. In 1885 the Metropolitan Board of Works introduced clauses in their Various Powers Bill to give the Board power to remove them, but in the face of opposition the clauses were withdrawn. The recommendation of the Committee was adopted.

The Metropolitan Water Supply.—The Special Committee on Water Supply presented the following report, which was approved:—"Your Committee have to report they have proceeded on the reference of the Council of March 19,—

'To consider the steps to be taken, if they so advise, as to acquiring the undertakings now supplying London with water, whether new sources of supply should be reported on by the Engineers of the Council, and if so, what time would be required for that purpose, having in view the reports of several Royal Commissions; such report to be presented not later than June next, in order to permit the requisite notices to be considered, prepared, and given in November for the ensuing session.'

It appears to your Committee that the first step necessary to enable them to deal with this important matter should be the institution of an inquiry as to the whole question of the water supply of London. As such an inquiry would necessarily involve considerable expense, your Committee called upon the Solicitor of the Council to advise as to the statutory powers possessed by the Council to expend money for such a purpose, and the Solicitor advised that no such power now exists. Your Committee have also ascertained that the Bill which has been prepared by the Parliamentary Committee for the purpose of conferring further powers upon the Council with respect to the water supply of London provides for the introduction by the Council of Bills into Parliament on the subject, and for enabling the Council to defray the expenses of making and carrying on inquiries and negotiations relating to such supply. In these circumstances your Committee have passed the following resolution—

'That it be reported to the Council that as the Committee are advised by the Solicitor that the Council has no power to incur any expense in connection with any inquiry as to the matter referred to them, the Committee are of opinion that such inquiry must not be entered upon until the Council has obtained from Parliament power to incur the expenditure necessary in making such inquiry.'

Your Committee, however, consider it desirable that the Council should be furnished with the information relating to the water supply of London which is contained in a large number of reports of Commissions and Committees, and in various other Parliamentary papers, copies of which are in the possession of the Council. This information is voluminous, and it appears to be desirable that a short digest of that portion of it which will be the most valuable to the Council should be prepared, and this can be done by the existing staff without incurring expense. When the digest has been prepared, the Committee propose to submit it for the information of the Council."

The Sewage Precipitation Works at Barking Outfall.—The Main Drainage Committee reported that they had received the usual fortnightly report with reference to the precipitation works at the Barking Outfall, and, although the statement was not comprised in the report, they had reason to believe that the progress made would allow, within a month or five weeks, some partial trials of machinery. The Committee were of opinion that by the end of July the precipitation works might be expected to be in operation.

After a long discussion arising out of the Local Government and Taxation Committee's report, as to the incidence of rating, the Council adjourned.

HOLIDAY HOMES.

SIR,—As in the alterations and erections of its many buildings the Ragged School Union has frequently had the valuable aid of many of your readers, they may now be disposed to help us in the main item of our summer's work—namely, providing our poorer little protégés with a fortnight's holiday in the country. The children are located in homes some of which have been specially built and endowed for the purpose, others are placed in houses hired for the season, and the remainder with respectable families. We are now making a special appeal for a new holiday home we want to build at Folkestone. Apart from that, our ordinary holiday homes' needs are gifts of money, parcels of new and second-hand clothing, boots, and offers of homes; so that in some way most of your readers could help us, and many of them will doubtless earn our gratitude by doing so. JOHN KIRK, Secretary.

Ragged School Union, Exeter Hall, Strand, W.C.

BOOTLE POLICE-COURT COMPETITION.

SIR,—Hearing, through what I believe to be a reliable source, that in this competition the Liverpool Society of Architects have sent to the committee the names of several of its members for selection as professional assessor, I, as an interested architect, at once enter my protest on the following grounds:—

Such a selection, if made by the committee, would doubtless be all the "L.S.A." could desire, but to the others (in my opinion the great majority) it would nullify the competition as not being in accordance with the terms which stipulate an "independent" assessor.

A MANCHESTER ARCHITECT.

The Student's Column.

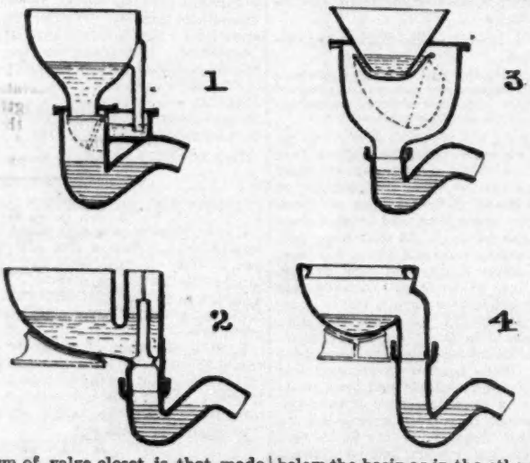
TOWN DRAINAGE.

XXI.—WATER-CLOSET APPARATUS.

A QUANTITY of water equal to about two gallons is discharged from a water-closet basin every time the water-valve is opened, which lets the water out of the cistern overhead into and through the basin, and the way in which this small body of water is discharged through the basin indicates the kind of closet, and gives a name to it,—as a valve-closet, a pan-closet, a wash-out, &c. The basin is supplied with water in several different ways, which are the same for several different forms of basin,—as, for instance, a valve-closet may be supplied through a water-valve on the supply-pipe near its lower end, or there may be no such valve; but it remains a valve-closet, the name being derived from the valve at the outlet of the basin. Misunderstandings occur sometimes by applying the term valve-closet to one in which the basin is supplied through a valve on the water supply pipe near its lower end.

There are four principal varieties of construction of a water-closet apparatus, two of which are valve-closets, although only one is called by that name. Another is the pan-closet, and the other form is the flush-out or wash-out. Each of these is varied in construction in detail by different makers, so that there is almost a numberless variety in all, but each may be referred to one or another of the four principal forms which are indicated by reference to the way in which a given quantity of water,—say two gallons,—is discharged through the basin. A valve-closet holds up the greater part of the water in the basin; the others only a small part of it, the greater part being discharged in a flush. Of the two forms of valve-closet, that alone retains the name which has the outlet of the basin closed

by a disc or valve underneath, as shown by fig. 1. In its general form it was invented by Joseph Bramah, the engineer, who invented also the hydraulic press. Since his time it has been improved in details so much that the valve is almost the only part which remains as of old. The quantity of water retained in the basin by the valve is about one and-a-half gallon, when a two-gallon quantity is let down from the cistern overhead. The valve is hinged on a pin which passes through the valve-box under the basin, and is turned by a horizontal lever outside, to the end of which the pull-up handle is attached. By the same action the water-valve is opened, being connected to the lever by another attachment, so that on the discharge of the one and-a-half gallon of water from the basin another equal quantity is let down into it, and this is followed by half-a-gallon more to fill up the unavoidable deficiency caused by the escape, out of the trap below, of about that quantity of water by reason of the momentum of the body of water falling through it from the basin. Two gallons is as much as is allowed by water companies when they have obtained Parliamentary powers to that effect, upon the plea of preventing waste of water, but it is hardly sufficient for a valve-closet, and the allowance should be increased to three gallons. Perhaps as much as that is used under the restrictions named, by repeatedly opening the valve.



The other form of valve-closet is that made by Mr. Jennings, of Lambeth, in which the outlet of the basin is at the side, closed by a plug, as in the second figure. About the same quantity of water is retained in the basin, and its discharge occurs in a similar manner. In this form the valve is kept close by its weight on the conical outlet; in the other the valve is closed by a weighted lever, which keeps it up to its seat. The pan-closet apparatus, fig. 3, is of different construction; the outlet of the basin dips an inch or two into water, held up in a pan which is hinged underneath the cover of an iron box, or container, which takes the place of the valve-box of the Bramah, or valve-closet, but is larger, this being made necessary by the depth of the pan having to be provided for when it is thrown back empty against the side of the box or container. The pan is keyed upon a pin which passes through the sides of the box, and is turned by a lever outside, as in the other case, having similar attachments to the water-valve. The pan contains about half a gallon of water. The emptying of this is followed by a flush of 1½ gallon, which clears out and refills the trap below. So far, it is well designed for its purpose. Its first practical defect is that the pan is not emptied directly into the mouth of the trap, unless the pan be thrown suddenly back, but its contents are poured upon the side of the container, and thence into the trap; while the water-flush which follows does not take the same course, but falls vertically from the basin into the mouth of the trap. The apparatus is capable of improvement in this respect by directing the stream of water from the basin into the course taken by that which is discharged from the pan. In the valve-closet, so-called, the disc requires but little room when thrown back, and the valve-box contains but little foul air; but the pan requires more room, and the container must be larger; it forms, therefore, a receptacle for a larger volume of foul air, some of which escapes through the basin while it is being flushed out. It is endeavoured to prevent the air in the container becoming foul by connecting it with the outside air by means of a pipe. When such an apparatus adjoins an outside wall, and the pipe is therefore short, it should be provided, if made large enough, say, 1 in. diameter at the least; but the best improvement would be to direct the stream of the water flush upon the part of the container which receives the contents of the pan. There are, however, one or two other objections to a movable pan; the hole through which the pin passes in the side of the container wears larger by use and lets the foul air escape into the apartment; the pan sometimes does not hold water; and, generally, the workman ship of the movable parts is not good enough for long wear.

To get rid of these objections altogether, another form of basin has been devised, without any valve or movable part whatever, and in which, therefore, the water is not held up. In that respect it is not as good as the valve-closet, while it is better than the valve-closet when only two gallons of water are allowed. It is better than the pan-closet in having no movable parts of bad workmanship, and no large receptacle between the basin and the trap. The bottom of the basin is hollow, so as to retain water an inch or two in depth in the centre, the outlet being at one side, front or back. It is represented by fig. 4, having a trap below the basin as in the other forms. Of these four forms of water-closet apparatus, shown by the figures, it may be observed that the trap is drawn alike in all. It is intended only to indicate that there is a trap in each case. Whether it should be of one form or another, or of one material or another, does not much affect the question with which we are at present concerned.

The valve upon the pipe which supplies the appointed quantity of water to a valve-closet basin may be situated near the lower end of the pipe, opened by the lever which opens the discharge-valve of the basin, and at the same time. The discharge-valve must be immediately shut, but the water-valve remains open long enough to let the given quantity pass through it. This is effected by—as one means—Mr. F. G. Underhay's vertical air-cylinder, within which a hollow piston moves up and down, having in the top a small hole which allows only a certain quantity of air to pass through it per second, the size of the hole being regulated by a screw so as to let less or more air pass through it in a given time. The time in which the given quantity of water can pass through the valve, according to its dimensions and the pressure of the water, is that to which the size of the air-hole is regulated. The hollow piston, or inner cylinder, having been raised by the lever, becomes disengaged, and falls again gradually, water continuing to flow through the valve into the basin as long as the piston continues to fall. In this way only a certain quantity of water can be used at a time, and in so far this regulator acts as a waste-preventer. Another form of valve which is also a waste-preventer is that of Messrs. Tyler & Sons, in which a vertical plunger covers the waterway of the valve when it is closed. The plunger is raised by the action of the lever which opens the basin-valve, in a manner similar to that of the other form. It descends automatically, whether its carrier descend or remain up, giving a rush of water immediately on the opening of the valve, and a gradually diminished rate of flow to the end. The advantage of having the water-valve at the lower end of the pipe is that the water is brought down close to the point of delivery, and it begins to flow into the basin at once on the valve being opened; but it is not so good for a flush-out or wash-out basin as a plug-valve in the mouth of a pipe in a cistern overhead.

RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

May 8.—By Farebrother, Ellis, & Co. (at Northampton).

Northampton, near to—Two f. farms, containing 593a. 3r. 11p., r. £783. 16s. p.a. £15,600
Hackleton—Freehold house and shop, r. £11 p.a.... 200
Piddington—Two f. cottages and schoolroom, r. £13. 12s. p.a. 220
Two cottages and three plots of land, 5a. 3r. 23p. 570

May 13.—By J. Baker & Sons.

Islington—24, Park-st., u.t. 27 yrs., g.r. £6. 10s., r. £36 p.a.; and Barnsbury, 42, College-st., u.t. 27 yrs., g.r. £6. 10s., r. £42 p.a. 460
Lower Clapton—125 to 131 (odd), Powerscroft-rd., u.t. 86 yrs., g.r. £20, r. £100 p.a. 775

By Beningfield & Tidy.

St. Margaret's—Freehold maltings with plant, r. £100 p.a. 600

By Marler & Bennett.

Regent's Park—23, Cumberland-ter., u.t. 36 yrs., g.r. £20, r. £160 p.a. 1,635

By J. J. Wheeler.

Putney—9a, Charlewood-rd., f., with possession ... 370

May 14.—By Rogers, Chapman, & Thomas.

Upper Norwood, Tudor-rd.—Tudor Lodge, f. 1,320
West Brompton—7, Merrington-rd., u.t. 68 yrs, g.r. £9, r. £35 p.a. 340

By Rutley, Son, & Vine.

Highgate Hill—No. 31, u.t. 48 yrs. g.r. £8, r. £80 p.a. 800
29, Brunswick-rd., u.t. 51 yrs., g.r. £5. 5s., r. £26 p.a. 170

By E. & H. Lumley.

Maidstone—Two plots of f. land, 2a. 2r. 10p..... 1,050

By Venton, Bull, & Cooper.

Fulham—61a, 67, 69, and 71, Marville-rd., u.t. 92 yrs., g.r. £51. 15s., r. £260 p.a. 1,430
Wandsworth Common, St. Ann's Hill—Ranmore Lodge, f. 1,410

May 15.—By J. & R. Kemp & Co.

Soho—80, Frith-st., f., r. £94 p.a. 2,000
Greek-st.—f.g.r. of £10, with reversion in 19 yrs. to e.r. £90 p.a. 710

By Elliott, Son, & Boyton.

Holborn—29, Kingsgate-st., u.t. 53 yrs., g.r. £90, r. £157 p.a. 770
Oxford-street—19, Castle-st., u.t. 58 yrs., g.r. £18, r. £110 p.a. 1,300
4, Little Titchfield-st., u.t. 59 yrs., g.r. £18, r. £80 p.a. 980
132 and 139, Gt. Titchfield-st., u.t. 22 yrs., g.r. £62, r. £160 p.a 1,070
11, Berners-st., u.t. 26 yrs., g.r. £70, r. £150 p.a. 850

By Furber, Price, & Furber.

Portland-place—16, Charlotte-st., u.t. 31 yrs., g.r. £24, r. £95 p.a. 750
Russell-square—38, Woburn-pl., u.t. 31 yrs., g.r. £16. 16s., r. £120 p.a. 920
20, Great Coram-st., u.t. 10 yrs., g.r. £30, r. £70 p.a. 150
Hampstead-road—17, Robert-st., u.t. 32 yrs., g.r. £7. 7s., r. £54 p.a. 565

By Farebrother, Ellis, & Co.

Camberwell New-road—No. 312, u.t. 66 yrs., g.r. £7, r. £38 p.a. 370

By D. Young.

Brixton, Canterbury-rd.—The l. of Effra-cottage, u.t. 18 yrs., r. £50 p.a. 100
Clapham—324, South Lambeth-rd., u.t. 46 yrs., g.r. £7, e.r. £50 p.a. 400
Wandsworth—5, Devonshire-rd., f., r. £41 p.a..... 540

May 16.—By Inman & Co.

Regent-street, Carnaby-st. — "The Ship" p.h., f., e.r. £75 p.a. 1,350
"The Harp" p.h., f., e.r. £85 p.a. 1,500
32, Carnaby-st., f., r. £105 p.a. 2,400
29, King-st., f., r. £55 p.a. 1,450

By E. Stimson.

Rotherhithe—13 and 15, Old-road, f., r. £35 p.a. 420
Clapham-road—29, Portland-pl. South, u.t. 31 yrs, g.r. £3, r. £30 p.a. 305
Nine Elms—13 and 49, Everett-st., u.t. 14 yrs., g.r. £7, r. £42. 18s. p.a. 85
62 and 64, Everett-st., u.t. 56 yrs., g.r. £7, r. £46. 16s. p.a. 210
Carshalton—51 to 55, Harold-rd., u.t. 93 yrs., g.r. £12. 10s., r. £52 p.a. 205

By Newbon & Harding.

Barnsbury—33, Belitha-villas, f., e.r. £55 p.a. 730
1, Arundel-sq., f., r. £55 p.a. 680
Islington—349, Liverpool-rd., f., r. £55 p.a. 630
47, 49, and 51, Essex-rd., f., r. £151 p.a. 2,460
Stoke Newington—16, Albion-rd., f., e.r. £45 p.a.... 535

By Phillips & Dyer.

Islington—30, Upper Park-st., u.t. 20 yrs. no g.r., r. £36 p.a. 250

By H. J. Bliss & Sons.

Bethnal-green—5 to 8, Bullard's-pl., u.t. 41 yrs., g.r. £26, r. £96. 4s. 300
53, St. Peter's-st., u.t. 56 yrs., g.r. £6, r. £40 p.a. 295

By Dowsett & Co.

Ilfracombe—Freehold fee farm rent of £18. 18s..... 280
Freehold fee farm rents of £35. 4s..... 515
A plot of land, 5a. 0r. 14p. 230
A plot of land, 12a. 0r. 20 p..... 1,350

May 17.—By Robson & Perrin.

Finsbury-park—2, Moreland-st., u.t. 76 yrs., g.r. £5. 5s., r. £44. 4s. p.a. 225

By A. A. FIELD.

Harrow-rd.—4, Sixth-avenue, u.t. 84 yrs., g.r. £4. 4s. £205
Southend, Essex—"Minerva Hotel," c., r. £801 p.a. 3,250

By GREEN & SON.

Caledonian-road—12 and 13, Edward-sq., u.t. 49 yrs., g.r. £30, r. £66 p.a. 285
46a, 46 to 52, Edward-sq., u.t. 51 yrs., g.r. £30, r. £247. 16s. p.a. 1,620
53, Edward-sq., u.t. 51 yrs., g.r. £2, r. £40 p.a.... 285
52, 54, and 56, Bemerton-st., u.t. 55 yrs., g.r. £18, r. £116 p.a. 500
8, 9, and 10, Thornhill Bridge-rd., u.t. 82 yrs., g.r. £21, r. £82. 10s. p.a. 515
1, Story-st., u.t. 55 yrs., g.r. £5, r. £30 p.a. 245

By REYNOLDS & EASON.

Shoreditch, Norfolk-st,—The "Norfolk Arms," f., r. £60 p.a. 1,300
Canonbury—4, Leaconfield-rd., u.t. 60 yrs., g.r. £5. 5s., e.r. £48 p.a. 300
Rotherhithe—219, Lower-rd., u.t. 62 yrs., g.r. £7. 17s. 6d., r. £60 p.a. 750
Spitalfields—19 to 25, Wentworth-st., 1 to 8 and duplicate Nos. 2 to 5, Eastman's-ct., f., r. £613. 12s. p.a 7,080

[*Contractions used in this list.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; yd. for yard, &c.]

MEETINGS.

SATURDAY, MAY 25.

Architectural Association.—Visit to House in Kensington-court. 3 p.m.

St. Paul's Ecclesiological Society.—Visit to St. Albans. Train leaves King's-cross (G.N.R.) 2.41 p.m.

Society for the Preservation of the Memorials of the Dead.—Seventh annual meeting, St. Luke's Girls' School, Church-street, Chelsea. 2.30 p.m.

MONDAY, MAY 27.

Surveyors' Institution.—Annual Dinner, Holborn Restaurant.

Society of Arts (Cantor Lectures).—Mr. H. Graham Harris on "Heat Engines other than Steam." IV. 8 p.m.

Liverpool Architectural Society.—(1) Election of Officers and Council for the ensuing session. (2) Closing address by the President, Mr. E. Kirby. 7 p.m.

TUESDAY, MAY 28.

Institution of Civil Engineers.—Annual general meeting to consider the report of the Council, and to elect the Council and officers for the ensuing year. 8 p.m.

Society of Arts (Foreign and Colonial Section).—Mr. J. S. Humbird on "The Westinghouse Alternating System of Central Station Electric Lighting in the United States of America." 8 p.m.

WEDNESDAY, MAY 29.

Society of Arts.—Mr. D. G. Hoey on "The Science of Ventilation as Applied to the Interior of Buildings." 8 p.m.

THURSDAY, MAY 30.

Society for the Encouragement of the Fine Arts.—The Third Conversazione. 8 p.m.

Institution of Electrical Engineers.—Discussion on Mr. W. M. Mordey's paper on "Alternate Current Working." 8 p.m.

SATURDAY, JUNE 1.

Royal Institution.—Professor W. Knight on "The Classification of the Sciences, Historical and Critical." 3 p.m.

Architectural Association.—Visit to the New Buildings at Eton College, Mr. A. W. Blomfield, architect.

Miscellanea.

The English Iron Trade.—The English iron market continues quiet, but firm. The business in pig iron is limited to prompt orders. Merchants are, to some extent, underselling makers; but, as the latter are booked well forward,—some to the end of the year,—there is no giving way whatever on their part in prices. Although at present, trade in finished iron is limited, there is a generally steady tone in the market. Manufacturers in the North of England are not quite so tenacious; those of Lancashire and Staffordshire, on the contrary, are stiffer in their rates, which have a hardening tendency. Makers of tinplates, in which there is a slightly better tone, are very firm, and their attitude seems to gain strength by the proposed amalgamation of tinplate works in the Midlands. The movement would benefit South Wales. The steel trade is unchanged, active and firm. Shipbuilding and engineering remain brisk.—*Iron.*

The North Sea-Baltic Canal.—The work of excavating the immense lock at the mouth of the North Sea-Baltic Canal at Brunsbüttel, on the North Sea, will be commenced in a few days; 220,000 cubic mètres of earth have to be excavated, and it is estimated that the work will occupy twelve months. Hamburg journals add that the German Emperor will shortly pay a visit to the works.

Registration of Plumbers—We would call the attention of our readers to an advertisement which appears in our columns this week, from which it will be seen that the Worshipful Company of Plumbers are desirous of obtaining the co-operation of all members of the trade in promoting a proposed mass meeting of plumbers to consider this important subject.

Australian Notes.—We take the following from the columns of the *Australian Builder and Contractors' News*, under date of March 30:—*Victoria.* — The Council of the Australian Health Society has resolved to urge the Premier to include in the Amended Health Bill, which he has promised to introduce into Parliament at an early date, a clause providing that for the future no sale of land in subdivision for building purposes shall be allowed to take place until the plan of subdivision shall have been approved by some responsible sanitary authority, and that no dwelling-house be erected until the plans thereof shall have been similarly approved. —The Minister of Water Supply has received from the borough of Hamilton, an application for a loan of £15,000, to be devoted to the improvement of the local water supply.—*New South Wales.*—St. Mary's Cathedral, Sydney, as the mother-church of the Australian colonies, is to receive from the Pope, in memorial of his jubilee, the gift of a handsome altar of Pyrenean marble.——At a mass meeting of Sydney plasterers, held last Saturday, it was resolved that 11s. a day be the recognised standard of wages for competent journeymen plasterers, and that the masters have the option of paying inferior workmen lower rates, but that they must first prove that the men to be so paid are really inferior workers.——A deputation from the unemployed waited upon Sir Henry Parkes at the Colonial Secretary's office last week, and were informed that public works would shortly be started which would give employment to about 2,000 men.——The Mayor of Sydney and the Corporation officials last week inspected and condemned or ordered to be repaired a number of dilapidated buildings.——*Queensland.*—Lighting by electricity is extending in Brisbane, the latest application of the system being that at the Royal Hotel, Queen's-street.——The Government have under consideration the question of putting down bores in the Brisbane district, in accordance with the recommendation of the Government geologist, Mr. Jack. Nothing definite has yet been decided, but the Government have secured two allotments of land at the racecourse, one of the sites recommended by Mr. Jack as a spot where water is likely to be found.——*New Zealand.*—The Governor laid the foundation-stone of the New Zealand and South Seas Exhibition at Dunedin on the 20th inst.——*Western Australia.*—The Perth City Council has decided to ask the Government to borrow a sufficient sum to carry out a scheme of water supply for Perth, the Council guaranteeing the interest on the loan, with a sinking-fund for the repayment of the amount.

Civil and Mechanical Engineers' Society.—The annual dinner of this Society was held at the Holborn Restaurant on May 15. The President, Mr. R. E. Middleton, M.Inst.C.E., M.I.M.E., F.S.I., occupied the chair, and a large number of members and visitors were present, among whom were Prof. Unwin, Mr. W. W. Beaumont, M.I.C.E. (joint editor of the *Engineer*), Captain J. Watson, Mr. H. Chatfield Clarke, and Mr. G. B. Oughterson, M.I.M.E. The usual loyal toasts having been duly honoured, Mr. Howard Chatfeild Clarke proposed "Success to the Civil and Mechanical Engineers' Society," coupled with the name of the President, who responded, and in the course of his remarks referred to the useful work which the Society had been able to do in the professions from which its members are drawn, to its friendly character, and to the assistance which it is able to afford both intellectually and materially to its younger members, and he exhorted his hearers to bear this valuable quality of the Society in mind, and to do their best to promote its interest. Other toasts followed, and a very successful and pleasant evening terminated with "Auld Lang Syne."

Memorials of the Dead.—The seventh annual meeting of the Society for Preserving Memorials of the Dead will be held at St. Luke's Girls' School, Church-street, Chelsea, near Chelsea Church, on Saturday, May 23, at 2.30 p.m., the Earl of Northesk, President of the Society, in the chair. At the conclusion of the meeting, the members of the Society, with their friends, will adjourn to St. Luke's Church, where they will be received by the Rev. R. H. Davies, the incumbent, and a paper will be read on the memorials and monuments in the church, by Mr. Randall Davies. The Society proposes to draft a Bill for the better preservation of monuments in churches and churchyards, and Lord Northesk has undertaken to introduce the Bill in the House of Lords.

British Archæological Association.—At the meeting on Wednesday, May 15, Mr. Thos. Morgan, F.S.A., in the chair, it was announced that a special meeting would be held on the 22nd to welcome the members of the Cambrian Archæological Association, who will then be paying a visit to London. Several curious articles of Etruscan ware were exhibited by Mr. Geo. R. Wright, F.S.A., and Mr. Roofe. Mr. Loftus Brock, F.S.A., described a figure of terra-cotta, apparently Mars, which was recently found near the Roman Camp in the valley of Christchurch, now the property of the Mayor of that town. Mr. Oliver exhibited rubbings of brasses from churches in Kent and Sussex, and Mr. Pritchett contributed sketches of another sepulchral monument,—namely, of the Clarevault Tomb in Croft Church, Darlington. A paper was then read by the Chairman on "Certain Phases of the History of Early Christianity in England," the progress of the faith being traced from its early beginnings until the period of the Battle of Brunanburgh, reference being made to the evidences, now becoming numerous, derived from the early crosses and incised slabs. The opinions of various writers relative to the site of the battle were discussed, and the weight of evidence was shown to be in favour of a site in the North of England rather than elsewhere. A long discussion followed the reading of the paper, in which Messrs. Romilly Allen, Brock, Birch, and others took part. Drawings were exhibited, made by Mr. Matthew Jones, City Surveyor of Chester, which showed the most recent discoveries made in the Roman wall of that city. Excavations have been carried along a fresh length of the north wall, which had proved that the ancient base is of large unmortared masonry,—just a plinth, precisely similar to what has been found elsewhere. The Mediæval wall, which is above the earlier base elsewhere, is not altogether so true, since, while the latter is straight in plan the former is somewhat irregular. The base is, therefore, in places below the wall, in others in front of it, greatly dilapidated. Its position shows beyond question that the base could never have been inserted at a later period below the Mediæval portion as stated when it was met with elsewhere. Mr. Romilly Allen, F.S.A. (Scot.) called attention to the dilapidated condition of the Roman columns from Reculver Church, now in the garden at Canterbury Cathedral. They need to be protected from the weather, and the fallen ones re-erected.

Railway Bridge over the St. Lawrence.—The construction of a cantilever bridge of gigantic dimensions across the St. Lawrence at Quebec has been resolved upon. It is to connect the Intercolonial Railway, from Halifax and St. John to Quebec, with the Canadian Pacific Railway, and will supply the last link necessary to give the Canadian Pacific an uninterrupted line from the Atlantic to the Pacific Ocean through Canadian territory. The width of the St. Lawrence from shore to shore at Quebec is about 4¼ miles, and the total length of the bridge, with approaches, will be nearly 6½ miles. Two main piers are to be constructed of solid granite in 40 ft. of water, about 500 ft. from each shore. These two piers are to support a cantilever of a span of 1,442 ft. The tops of the bridge from high-water mark will be 408 ft.

The Hamburg Exhibition.—The great Industrial Exhibition, which has been in preparation since 1887, will be opened in Hamburg shortly, and will remain open all the summer. It is situated on an excellent site near the Botanical and Zoological Gardens, its area being 16,000 square feet. The guarantee fund amounts to 500,000 marks, and the prizes to 50,000 marks. The demand for space has been so great that as long ago as November no further entries could be made. In connexion with the Industrial Exhibition there is also an exhibition of paintings by Hamburg artists. A commercial exhibition will also take place, demonstrating the important rôle played by Hamburg commerce in relation to the industries of the city.

Cremation in Germany.—The authorities of the City of Berlin appear to be more bigoted on this subject than those of any other city in Europe, the Cremation Society of the German capital having been refused permission to erect a crematorium. In consequence, the Minister of the Interior has been appealed to.——The Cremation Society of Hamburg has obtained a free grant of land from the city, near the Central Cemetery, for their crematorium. The necessary funds having also been contributed, building operations are to be begun forthwith.

East of Scotland Engineering Association.—The first excursion of the members of this Association for the session took place on Saturday afternoon last, when, by permission of Messrs. Tancred, Arrol, & Co., the Forth Bridge works were visited. The party numbered upwards of thirty, and were under the leadership of Mr. J. B. Bennett, A.M.Inst.C.E., the President, and Mr. W. Fairley, C.E., the Secretary of the Association. In the workshops, where signs were apparent that this great structure is approaching completion, the chief objects of interest were the girders which are to connect the ends of the cantilevers, the top and bottom booms of which are being prepared for erection. Special attention was given to the very ingenious arrangements for attaching these girders to the ends of the cantilevers, allowing free play for expansion and contraction due to changes of temperature. On the bridge itself the approach viaducts are almost complete, and on the south side a space of only 50 or 60 ft. now intervenes between the approach and the cantilever, and this is expected to be filled up before the end of next month, thus connecting the south cantilever with the shore.

The Home Arts and Industries Association.—The annual exhibition of work done in the classes of the Home Arts and Industries Association, including wood carving, repoussé and metal work, bent iron, embossed leather, mosaic, pottery, baskets, rugs, embroidery, lace, handspun linen, rabbit wool, cloth, &c., will be held at the studios, Royal Albert Hall, from the 3rd to the 8th of June.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I.....load	11 0 0	15 0 0
Sequoia, U.S.....foot cube	0 2 3	0 3 0
Ash, Canada.....load	3 10 0	5 0 0
Birch ,, ...	3 10 0	6 0 0
Elm ,, ...	4 0 0	5 0 0
Fir, Dantsic, &c.	2 0 0	3 10 0
Oak ,, ...	2 10 0	4 10 0
Canada	5 10 0	7 10 0
Pine, Canada red	3 5 0	4 0 0
,, yellow	3 10 0	5 10 0
Lath, Dantsic.....fathom	4 10 0	5 10 0
St. Petersburg.....	5 0 0	6 10 0
Wainscot, Riga, &c.....log	2 15 0	4 5 0
,, Odessa, crown.....	0 0 0	0 0 0
Deals, Finland, 2nd and 1st...std.100	9 10 0	11 0 0
,, ,, 4th and 3rd.....	8 0 0	9 0 0
Riga	7 10 0	9 0 0
St. Petersburg, 1st yellow	11 0 0	15 0 0
,, 2nd ,, ...	10 0 0	11 0 0
,, white	7 10 0	10 10 0
Swedish	9 0 0	16 0 0
White Sea	9 10 0	17 0 0
Canada, Pine, 1st	16 0 0	26 10 0
,, ,, 2nd	11 0 0	17 10 0
,, ,, 3rd, &c.	8 0 0	10 10 0
,, Spruce, 1st	9 10 0	11 0 0
,, ,, 3rd and 2nd	7 10 0	9 0 0
New Brunswick, &c.	6 15 0	8 15 0
Battens, all kinds	6 10 0	20 0 0
Flooring Boards, sq., 1 in., prepared, First	0 11 0	0 14 6
Second	0 8 0	0 10 9
Other qualities	0 5 6	0 7 9
Cedar, Cuba.....foot	0 0 4½	0 0 4½
Honduras, &c.....	0 0 4	0 0 4½
Mahogany, Cuba	0 0 4½	0 0 6½
St. Domingo, cargo average	0 0 4½	0 0 6½
Mexican ,, ...	0 0 4½	0 0 5½
Tobasco ,, ...	0 0 5½	0 0 6½
Honduras ,, ...	0 0 5½	0 0 6½
Box, Turkey .....ton	4 0 0	12 0 0
Rose, Rio.....	15 0 0	20 0 0
Bahia	14 0 0	18 0 0
Satin, St. Domingo .....foot	0 0 8	0 1 0
Porto Rico	0 0 9	0 1 3
Walnut, Italian	0 0 4½	0 0 6½
METALS.		
Iron—Bar, Welsh, in London...ton	5 5 0	5 10 0
,, ,, at works in Wales ...	4 15 0	5 0 0
,, Staffordshire, in London ...	5 10 0	6 10 0
Copper—		
British, cake and ingot..... ton	43 0 0	44 0 0
Best selected	44 0 0	45 0 0
Sheets, strong	50 0 0	0 0 0
Australian	0 0 0	0 0 0
Chili, bars	39 10 0	0 0 0
Yellow Metal.....lb.	0 0 5	0 0 5½
Lead—Sheet, English.....ton	13 10 0	14 0 0
Spelter—		
Silesian, special .....ton	18 2 6	0 0 0
Ordinary brands.....	18 0 0	0 0 0
Tin—		
Straits .....ton	93 0 0	0 0 0
Australian	92 0 0	0 0 0
English Ingots.....	95 0 0	0 0 0
Zinc—English sheet .....ton	21 0 0	22 0 0
OILS.		
Linseed .....ton	19 5 0	19 12 6
Cocoanut, Cochin	27 0 0	28 0 0
Ceylon	24 15 0	25 0 0
Palm, Lagos	23 10 0	0 0 0
Rapeseed, English pale	28 0 0	28 5 0
,, brown	26 10 0	0 0 0
Cottonseed, refined	24 10 0	25 10 0
Tallow and Oleine	19 0 0	45 0 0
Lubricating, U.S.	5 0 0	6 0 0
,, refined	7 0 0	12 0 0
Tar—Stockholm .....barrel	1 2 9	1 3 0
Archangel	0 15 0	0 0 0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Kerbing, Tarpaving, &c.	Lewisham Bd. of Works	*Official*	May 28th	ii.
Yarmouth Shingle Concrete Paving	Hanwell Local Board...	E. J. W. Herbert	May 29th	ii.
Sheltered Seats, Herne Bay	The Committee		May 30th	x.
Piggery, Boiling House, &c., Plumstead	R. A. Co-operative Soc.	J. O. Cook	do.	x.
Lead Guttering	Kent Asylum, Maidstone		May 31st	x.
Temporary Wooden Stand, Newmarket	Stewards Jockey Club	W. C. & A. S. Manning	June 1st	x.
Fire Escapes, Staircases, &c., Darenth Asylum	Met. Asylums Board ...	A. & C. Harston	June 3rd	ii.
10-ton Steam Road Roller	Hornsey Local Board ...	T. de Courcy Meade ...	do.	x.
Extension of Sewer Outfall	Eastbourne Town Coun.	C. Tomes	do.	x.
Brick Sewer at Kingston-on-Thames	Surbiton Imp. Com. ...	Samuel Mather	do.	x.
Re-construction of Riverford Viaduct, &c.	G. W. R. Co.	*Official*	June 4th	x.
Making Good Alexandra-road	Southend Local Board	P. Dodd	do.	x.
Sewage Filters	Tottenham Local Board	J. E. Worth	do.	ii.
Pipe Sewers, &c.	Hastings R.S.A.	Jeffery & Skiller	June 5th	ii.
Works of Water Supply	Pontefract Corporation	G. Hodson	June 6th	ii.
Broken Granite	St Matthew (Bethnal Green) Vestry	F. W. Barratt	do.	x.
Scavenging, Dusting, and Watering	do.	do.	do.	x.
Making-up Private Streets	Bromley R.S.A.	*Official*	do.	ii.
Postal Sorting Office, Leyton	Com. of H.M. Works	do.	June 7th	ii.
New Post Office, Bilston	do.	do.	June 12th	x.
Concrete Embankment Walls, &c.	Greenwich Bd. of Wks	do.	do.	x.
Erection and Enlargement of Schools	School Brd. for London	do.	Not stated.	x.
Painting Barracks, Aldershot	War Department	do.	do.	ii.
Painting, Whitewashing, &c., Plymouth	do.	do.	do.	x.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Clerk of the Works	Poplar Union	4*l.* 4*s.* per week	May 27th	xvi.
Road Foreman	Kingston-on-Thames Corporation	2*l.* 2*s.* weekly	May 29th	xvi.
County Surveyor	Salop County Council	450*l.*	June 1st	xvi.
Surveyor	Horwich Local Board...	175*l.*	June 3rd	xvi.
Surveyor	Aldershot Local Board	Not stated	June 4th	xvi.
Draughtsman in Patent Office	Civil Service Com.	do.	June 5th	xvi.

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

ACTON.—For making, sewering, channelling, and kerbing a new road at Acton, to be called Goldsmith-road. Mr. Edward Monson, jun., surveyor, Acton :—

J. Pizzey Hornsey (accepted), ...	£825 0 0

ASHTEAD (Surrey).—For the erection of a detached residence at Ashtead, Surrey, for Mr. H. Furze. Mr. St. Pierre Harris, architect, &c., 1, Basinghall-street :—

Holt, Croydon	£1,650 0 0
Skilton, Leatherhead (accepted).....	1,430 0 0

BRISTOL.—For new Wesleyan Chapel, Westbury-on-Trym. Mr. Herbert J. Jones, architect, Bristol :—

E. Walters.....	£2,911 0 0
G. Humphreys	2,786 0 0
Eastabrook & Sons	2,763 0 0
E. T. Hatherley	2,657 0 0
Cowlin & Son	2,635 0 0
J. Bastow	2,610 0 0
W. Church.....	2,587 0 0
J. Perrott	2,348 0 0
C. A. Hayes	2,245 0 0
T. R. Lewis*	2,148 0 0
T. H. Brown (withdrawn).....	1,950 0 0

[All of Bristol.]

* Accepted subject to omissions and variations to reduce amount to £2,000.

BRISTOL.—For alterations and sanitary works at Chatford House, Clifton Downs, for Mr. W. Howell Davies. Mr. Herbert J. Jones, architect, Bristol :—

Eastabrook & Sons.....	£759 0 0
G. Humphreys	734 0 0
W. Church.....	720 0 "
T. R. Lewis	660 0 0
J. Perrott (accepted)	582 0 0

BRISTOL.—For alterations to schoolroom, Wesley Chapel, Baptist Mills. Mr. Herbert J. Jones, architect, Bristol :—

W. Church.....	£197 0 0
Eastabrook & Sons	190 0 0
T. R. Lewis	184 0 0
G. Humphreys.....	177 14 0
J. Perrott (accepted).....	168 0 0

BRISTOL. — For works at Pucklechurch Church, Bristol. Mr. John D. Sedding, architect, 447, Oxford-street :—

Brock & Son	£1,312 0 0
Merrick & Son	1,296 0 0
Turner (accepted)	1,166 0 0
Cowlin & Son	1,157 0 0

EASTBOURNE.—For erecting All Saints' Convalescent Hospital for Children, Eastbourne. Mr. A. Mardon Mowbray, architect, Oxford. Quantities by Messrs. Henry Cooper & Sons, surveyors, Maidenhead and Reading :—

Mark Martin, Eastbourne	£11,405 0 0
Parnell & Sons, Rugby.....	11,341 0 0
Claridge & Bloxham, Banbury	11,250 0 0
Shillitoe & Sons, Bury St. Edmunds	11,182 0 0
Huggett & Pattenden, Eastbourne..	11,012 10 0
Peerless, Eastbourne.....	10,587 0 0
Smith, High Wycombe.....	10,500 0 0
Kingerlee, Oxford	10,280 0 0
Rollason, London	10,120 16 0
Longley & Co., Crawley, Sussex* ...	9,750 0 0

* Accepted.

EASTBOURNE.—For verandah roof, &c., at Eastbourne Station, for the London, Brighton, and South Coast Railway Co. Mr. Fred. D. Banister, engineer :—

Arthur M. Deacon & Co., West Norwood (accepted)	£518 0 0

CHESHAM.—For erecting schools at White Hill, Chesham, for the Chesham School Board. Mr. W. H. Syme, architect, Watford and Chesham :—

Darlington, Amersham	£5,060 0 0
Turner & Co., Watford	4,939 0 0
Waterman, Watford	4,777 0 0
Miskin, St. Albans	4,698 0 0
Kingerlee, Oxford	4,480 0 0
Loosley, Wycombe	4,440 0 0
Honour & Son, Tring	4,424 0 0
Mead, Chesham	4,290 0 0
Dupont, Colchester	4,250 0 0
G. Green, jun., Aylesbury	4,100 0 0
Boughton, Chesham (accepted)	3,969 0 0

DARENTH (Kent).—For electric fire-signal system at the School and Asylum for Imbeciles, Darenth, Kent, for the Metropolitan Asylum Board. Messrs. A. & C. Harston, architects, 15, Leadenhall-street, E.C. Quantities not supplied :—

Binko & Co.	£740 10 0 !
F. J. Lovett	625 0 0
Bailey & Grundy.....	558 0 0
Strode & Co.....	540 0 0
J. Sax.....	488 0 0
Wadley Bros.	473 8 0
Cox, Walkers, & Co.	438 8 0
Harrison & Co.	420 0 0
Blenheim & Co.	398 0 0
Fowler, Lancaster, & Co.....	360 10 0
Spagnoletti & Crooks.....	348 0 0
Gent & Co.	333 0 0
Dale & Co., Limited, 26, Ludgate-hill, E.C. (accepted)	318 0 0
J. Blackburn	299 16 5 !

DARTFORD.—For new infirmary for the Dartford Union. Mr. G. H. Tait, M. Inst. C.E., engineer and architect, Dartford. Quantities not supplied :—

	A.	B.	Total.
B. E. Nightingale, Lambeth	£1,039	£7,176	£8,215
Garlick & Horton, Sloane-st., S.W....	1,000	6,500	7,500
Naylor & Sons, Rochester	930	5,685	6,615
Longley & Co., Crawley	851	5,538	6,389
R. A. Lowe, Chislehurst	1,051	5,311	6,362
W. & E. Wallis, Gravesend	850	5,250	6,100
T. Knight, Sidcup...	825	5,204	6,029

HARLESDEN.—For the erection of one pair of semi-detached cottages, for the Fellows and Warden of All Souls. Messrs. Purves & Done, architects :—

Dabbs	£750 0 0
Martin Wells & Co.	730 0 0
Pryor	710 0 0
Oldrey & Co.....	700 0 0
Langler & Pinkham	700 0 0
Goodman	679 0 0
Fairthorne & Co. (accepted).....	660 0 0

ISLEWORTH.—For painting, &c., at the Brentford District Schools, Isleworth. Mr. Edward Monson, jun., architect, Acton :—

G. Barnham, Isleworth (accepted) ...	£235 0 0

IVER (Bucks.).—For four double cottages, for Messrs. Wm. Mead & Co. No quantities :—

Hardy.....	£565 0 0
Jones	540 0 0
A. & B. Hanson	532 0 0
Brown & Sons	525 0 0
Hall.....	525 0 0
Beckett	454 0 0
Chadwell & Son (accepted)	451 0 0

LONDON.—For work at hotel at South-street and South-place, Finsbury, E.C., for Messrs. J. & A. A. Armfield. Mr. W. M. Yetts, architect, 44, Finsbury-place, E.C. Quantities by Messrs. R. L. Curtis & Son, London-wall, E.C.:—

Ashby & Horner	£42,000	0	0
Mowlem & Co.	41,240	0	0
Colls & Son	41,000	0	0
Woodward & Co.	40,976	0	0
Higgs & Hill	40,700	0	0
Ashby Brothers	40,640	0	0
Adamson & Son	40,530	0	0
Patman & Fotheringham	39,977	0	0
Hobb & Co., Limited	39,700	0	0
Nightingale	39,690	0	0
Rider & Son	38,980	0	0
Brass	38,753	0	0
W. Downs	38,416	0	0
Peto	37,997	0	0
Jerrard	37,880	0	0
Bywaters	37,780	0	0
Lawrence	37,700	0	0
Morter	36,573	0	0
Garlick & Horton, Limited	36,500	0	0

LONDON.—For the erection of new building at junction of Arthur-street East with Lower Thames-street, for the Corporation of the City of London. Mr. Alexander Peebles, architect; Mr. W. R. Stoner and Messrs. Franklin & Andrews, surveyors:—

Cubitt	£18,133	0	0
Holland & Hannen	17,817	0	0
Lawrance & Sons	17,100	0	0
Morter	16,800	0	0
Peto	16,572	0	0
Clarke & Bracey	16,149	0	0
Hall, Beddall, & Co.	16,137	0	0
Downs	16,100	0	0
Mark Gentry	15,850	0	0
Ashby & Horner	15,840	0	0
Nightingale	15,800	0	0
Chappell	15,600	0	0
Colls & Sons	15,325	0	0
Mowlem & Co.	15,120	0	0

LONDON.—For erecting a new warehouse at the corner of Worship-street and Paul-street, Finsbury. Mr. Edward Street, architect:—

Dove Bros.	£4,975	0	0
Jno. Anley	4,466	0	0
Nightingale	4,271	0	0
W. Larter	4,245	0	0
W. Downs	4,190	0	0
Killby & Gayford	4,134	0	0

LONDON.—For the erection of new warehouse, stabling, and dwellings, at Church-street, Fulham, for Messrs. Carter Paterson & Co., Limited, under the superintendence of William Eve, F.S.I., 10, Union-court, Old Broad-street, E.C.:—

Adamson & Son	£6,495	0	0
Dabbs	6,397	0	0
Holland	6,304	0	0
Chappell	6,216	0	0
Godfrey & Son	6,185	0	0
Burman	6,040	0	0
Chessum & Sons	6,028	0	0
Downs	5,950	0	0
Harris & Wardrop	5,915	0	0
Higgs, F. & H. F.	5,865	0	0
Johnson, J. H., St. Ann's Wharf, Limehouse (accepted)	5,858	0	0

[Holliday & Greenwood (too late).]

LONDON.—For additional stabling, &c., at 14, Castle-street, Finsbury, E.C., for Messrs. McNamara & Co. Mr. G. T. Lanham, surveyor. Quantities by Mr. A. J. Bolton:—

Knight	£3,450	0	0
Barrett & Power	3,438	0	0
Stephenson	3,160	0	0
Garrud	3,147	0	0
Toms	3,119	0	0
Hunt	3,050	0	0
G. Parker (accepted)	3,049	0	0

LONDON.—For new building, Orange-street, Southwark, for the Southwark Foundry Company, Limited, adjoining and in connexion with Messrs. Hayward Brothers & Eckstein's premises. Messrs. Ford & Hesketh, architects:—

Oldrey & Co.	£2,962	0	0
Rider & Son	2,948	0	0
J. Morter	2,962	0	0
W. Downs	2,851	0	0
Turtle & Appleton	2,770	0	0
Stubbs	2,730	0	0
J. Holloway	2,688	0	0
Lawrance & Son	2,674	0	0
Holloway Bros. (accepted)	2,527	0	0

LONDON.—For alterations, repairs, and fitting up new bar and shop front, &c., at the "Coach and Horses," Greek-street, Soho, W.C., for the Cannon Brewery Co., Clerkenwell, E.C. Mr. J. C. Reynolds, architect, 30, Camberwell-green, S.E.:—

Drew & Cadman, Holborn	£1,998	0	0
Jackson & Todd, Hackney-road	1,810	0	0
J. Walker, Limehouse	1,728	0	0
J. & Hy. Cocks, Mile End	1,597	0	0

LONDON.—For warming the Langford-road School on the low-pressure hot-water system, for the School Board for London. Mr. T. J. Bailey, architect:—

H. C. Price, Lea, & Co.	£727	0	0
J. G. Wagstaff	690	0	0
C. P. Kinnell & Co.	670	0	0
W. Jenkins & Son	645	10	0
Emley & Sons, Limited	629	0	0
J. & F. May	595	0	0
R. H. & J. Pearson	589	10	0
J. & C. Christie	562	0	0
Eagle Iron and Engineering Company	525	0	0
Hayward Bros. & Eckstein	520	0	0
Jones & Attwood	505	0	0
R. Crane	500	0	0
J. Grundy	500	0	0
W. J. Cannon	498	0	0
T. Green & Son, Limited	464	0	0
Purcell & Nobbs*	439	0	0

* Accepted by the Works Committee.

LONDON.—For warming the Brackenbury-road School, Hammersmith, on the low-pressure hot-water system, for the School Board for London. Mr. T. J. Bailey, architect:—

T. Wontner Smith, Gray, & Co.	£850	0	0
C. P. Kinnel & Co.	780	0	0
R. H. & J. Pearson	760	0	0
W. Jenkins & Son	756	10	0
H. C. Price, Lea, & Co.	745	0	0
Emley & Sons, Lim.	730	0	0
Thomas & Taylor	718	12	8
J. G. Wagstaff	715	0	0
J. & F. May	675	0	0
J. & C. Christie	670	0	0
Hayward Bros. & Eckstein	660	0	0
J. Grundy	640	0	0
Purcell & Nobbs	623	0	0
R. Crane	600	0	0
T. Green & Son	598	0	0
Jones & Attwood	580	0	0
W. J. Cannon*	565	0	0

* Recommended by the Works Committee for acceptance.

LONDON.—For providing new rooms for the teachers of all departments of the Shap-street School, Kingsland, and also cloak-rooms for the Boys' and Girls' departments, for the School Board for London. Mr. T. J. Bailey, architect:—

Simmonds Bros.	£993	0	0
Norris & Luke	674	0	0
F. Carter*	525	0	0

* Recommended by the Works' Committee for acceptance.

LONDON.—For enclosing, levelling, draining, and tarpaving the additional land adjoining the Everington-street School, for the School Board for London. Mr. T. J. Bailey, architect:—

Simmonds Bros.*	£495	0	0

* Recommended by the Works' Committee for acceptance.

LONDON.—For addition to offices at Islington Workhouse, for the Guardians of St. Mary's, Islington. Mr. W. Smith, architect:—

Linfold	£345	0	0
Mattock Bros.	328	0	0
Langham	315	0	0
Turner	306	0	0
MacFarline Bros.	298	0	0
Stevens Bros.	294	0	0
Dearing & Son	290	0	0
Larke & Son	274	0	0
Clarke Bros.	265	0	0
Edmonds	248	0	0
Ball	248	0	0
Wilkinson Bros.	247	0	0
Lown & Son	245	0	0
Brown & Sweetland	230	0	0
Ward & Lamble (accepted)	227	0	0
Beaves Bros.	225	0	0
Wicks	195	0	0
Baylis	189	2	0

LONDON.—For taking up old and relaying new drains at the St. Marylebone Parochial Schools, Southall, for the Guardians of the Poor of the Parish of St. Marylebone. H. Saxon Snell & Son, architects, London:—

George Gaisford	£1,980	0	0
E. Rogers & Co.	1,957	0	0
Wall Bros.	1,885	0	0
Staines & Son	1,584	0	0
G. Gibson	1,569	0	0
W. Brown	1,385	0	0
C. Killingback (accepted)	1,350	0	0

LONDON.—For repairs and painting to be done to eleven houses in Anderson's-walk, Lambeth, for Mrs. Fancourt. Mr. Banister Fletcher, architect:—

B. E. Nightingale (accepted)	£420	0	0

LONDON.—For sanitary works and decorations at No. 47, Beaufort-gardens, S.W., for Mr. Jules Desme:—

J. Tinson & Sons (accepted)	£308	0	0

[No competition.]

LONDON.—For alterations and additions to 180, Great Titchfield-street, W., for Mr. W. Parfett:—

J. Tinson & Sons (accepted)	£285	0	0

LONDON.—For alterations to No. 27, St. Mary-at-Hill. Mr. C. G. Baker, architect, 5, Bloomsbury-square, W.C.:—

Hawtrey & Son	£329	0	0
Edwards	259	0	0
Weeks	258	0	0
Carter	247	0	0

LONDON.—For pulling down and rebuilding Nos. 416 and 418, Holloway-road, for Messrs. Flatau & Co. Mr. T. E. Knightley, architect, 106, Cannon-street:—

Kirk & Randall	£2,231	0	0
Kettle	2,133	0	0
C. Wall	2,120	0	0
J. & J. Greenwood	2,097	0	0
Ward & Lamble	2,087	0	0

LONDON.—For pulling down and rebuilding the "Spread Eagle" public-house, Bloomsbury, for the Burton Brewery Co. Mr. T. S. Archer, architect, 2, Gresham-buildings:—

Toms	£1,157	0	0
Ansell	1,143	0	0
Holliday & Greenwood	1,110	0	0
Ward & Lamble	1,102	0	0
Jackson & Todd	1,049	0	0

LONDON.—For alterations to "The Castle" public-house, 147, Kentish Town-road, for Mr. Locke. Messrs. Furniss & Thorpe, architects, 60, Kentish Town-road:—

Scrivener	£1,735	0	0
Anley	1,728	0	0
Toms	1,695	0	0
Voller	1,681	0	0
Gould & Brand	1,666	0	0

LONDON.—For alterations to the "Railway Tavern" beerhouse, Willis-street, Bromley-by-Bow, for Mr. E. Spicer. Mr. E. T. Clarke, architect:—

Walker	£466	0	0
Spencer & Co.	435	0	0
Doherty	417	0	0
James A. Taylor	409	0	0

LONDON.—For stables, 6, Upper Thames-street. Messrs. Hudson, Son, & Booth, architects. Quantities by Mr. H. Lovegrove, 26, Budge-row, E.C.:—

Colls & Son	£1,491	0	0
Greenwood	1,446	0	0
Stimpson & Co.	1,558	0	0
Laurence & Son	1,520	0	0
Hall & Beddall	1,491	0	0
Scrivener & Co.	1,488	0	0
Rider & Son	1,478	0	0
Nightingale (accepted)	1,435	0	0

LONDON.—For alterations at 37 and 39, Stepney-green, E. Messrs. Davis & Emanuel, architects:—

C. A. King, 46, Fenchurch-street	£173	0	0
F. & F. J. Wood, 64, Cleveland-street, E.	169	0	0

LONDON.—For shop-fronts at "Tavistock" and "Russell" Chambers, Hart-street, Bloomsbury. Mr. W. Beckham Witherington, architect, 79, Mark-lane:—

Patman & Fotheringham	£497	0	0
Lascelles & Co.	469	0	0

LONDON.—For alterations and repairs to 236, High Holborn, for the Aërated Bread Company. Mr. G. Edwards, architect, 52, Cannon-street:—

Barnett	£460	0	0
Green & Lea	445	0	0
Ward & Lamble	437	0	0
Scharien	421	0	0
C. Wall	360	0	0
Stevens	299	0	0

LONDON.—For alterations and repairs to the "British Stores" public-house, for Mr. Cremmer. Messrs. Saville & Martin, architect, 87, Strand:—

Yeare & Co.	£384	0	0
Burch	372	10	0
Walker	298	0	0
Ward & Lamble	270	0	0
C. Baits	247	0	0
Spencer & Co.	245	0	0

LONDON.—For new counter and bar fittings to the Café de l'Europe, Haymarket, for Mr. H. Clarke. Mr. Walter Graves, architect, Winchester House, E.C.:—

F. Sage & Co.	£134	12	6

LONDON.—For the erection of seven shops, North End-road, West Kensington, for Mr. E. J. Scriven:—

Flew & Co. (accepted)	£6,900	0	0

MANSFIELD (Notts).—For erecting four houses, Nottingham-road, Mansfield, for Mr. W. Shippam. Mr. R. Frank Vallance, architect, Mansfield:—

W. A. Vallance, Mansfield	£895	0	0
James Evans, of Sutton-in-Ashfield	883	5	0
Saml. Dudson, Mansfield (accepted)	679	0	0

MARPLE.—For oak panelling in library at Marple, for Mr. G. H. Hill. Messrs. J. W. & R. F. Beaumont, architects:—

C. Hindley & Sons (accepted)	£198	10	0

NORMANTON.—For erecting house, shop, warehouse, and stabling, High-street, Normanton. Mr. William Watson, architect, Wakefield:—

Accepted Tenders.

James Bramham (Excavating, Brick, and Stone)	£364	0	0
Pickles Bros. (Slating)	37	0	0
T. C. Tattersall (Plastering)	35	6	3
Henry Gibson (Carpenter and Joiner)	285	0	0
Thos. Brooke (Plumbing, Glazing, and Ironwork)	96	0	0
George Powell (Painting)	14	18	0

NORMANTON.—For erecting three dwelling-houses, High-street, Normanton. Mr. William Watson, architect, Wakefield:—

Accepted Tenders.

James Bramham (Excavating, Brick, and Stone)	£527	0	0
Pickles Bros. (Slating)	46	6	0
Joseph Reynolds (Plastering)	59	19	0
W. H. Hutchinson (Carpenter and Joiner)	333	0	0
Thos. Brooke (Plumbing, Glazing, and Ironwork)	77	0	0
Thos. Naylor (Painting)	16	10	0

ORPINGTON.—For the erection of shop, house, and stables at High-street, Orpington, for Mr. W. P. Taylor. Mr. St. Pierre Harris, architect and surveyor, 1, Basinghall-street:—

Johnson	£1,979	0	0
Otway	1,934	0	0
Holt	1,900	0	0
Wood	1,772	0	0
Knight	1,760	0	0
Somerford & Son*	1,736	0	0

* Accepted subject to modification.

ORPINGTON.—For additions, alterations, and repairs to private residence near Orpington, Kent. Mr. St. Pierre Harris, architect and surveyor, 1, Basinghall-street:—

Somerford & Son	£1,175	0	0
Knight	889	0	0
Holt	850	10	0
Otway (accepted)	850	0	0

PAIGNTON (Devon).—For building a cottage hospital, Paignton, for Messrs. M. & W. Singer. Mr. George Soudon Bridgman, architect, Torquay:—

H. Webber, Paignton (accepted)	£1,825	10	0

PAIGNTON (Devon).—For building a house, and offices adjoining, at Paignton, for Mr. George Soudon Bridgman, architect, Paignton:—

Marcus Bridgman (accepted)	£1,073	19	6

SOUTHWOLD.—For the erection of water-tower and engine-house, the supplying and fixing of pumping machinery, and the supplying and laying of cast-iron water mains, for the Southwold Waterworks Company, Limited. Messrs. Urban Smith & Arthur Pain, C.E., joint engineers, Westminster:—

Shillitoe & Son, Bury St. Edmunds	£4,515	15	3
Geo. Gibson, Southall	3,978	0	0
Alfred Coe, Ipswich	3,824	11	0
A. J. Gould, Stony Stratford	3,804	3	3
Geo. Bell, Tottenham	3,741	0	0
Alfred Dodman, King's Lynn	3,702	7	0
Frederick Dupont, Colchester *	3,646	0	0

* Accepted.

TOTTENHAM.—For additions, &c., to "The Swan" Inn, High Cross, for Messrs. Purse & Co. Mr. J. H. Couchman, architect, High-road, Tottenham:—

Knight & Son	£1,163	0	0
G. L. Wilson & Co., Limited	970	0	0
Wilson & Stickley	960	0	0
Little & Senecal	940	0	0
Percival Hart, Tottenham	898	10	0

TOTTENHAM.—For altering drains and laying new sewers on the Stonsleys estate, Tottenham, for Mr. H. C. Williams. Mr. J. H. Couchman, surveyor, High-road, Tottenham:—

G. L. Wilson & Co., Limited	£126	0	0
Percival Hart	102	0	0

WAKEFIELD.—For erecting five houses and shop, Jacob's Well-road, Wakefield. Mr. William Watson, architect, Wakefield:—

E. A. Elvey (accepted for all work)	£975	10	0

WAKEFIELD.—For erecting offices for the Gas Light Co., Wakefield. Mr. William Watson, architect, Wakefield:—

Accepted Tenders.

J. S., Rd., & W. Flower (Excavating, Brick, and Stone)	£1,072	0	0
C. F. Rycroft (Slating)	65	10	0
Chas. Driver (Plastering)	74	0	0
Chas. Squires (Carpenter and Joiner)	410	0	0
Ed. Kirk (Plumbing, Glazing, and Ironwork)	210	10	6
Goodall, Lister, & Co. (Painting)	15	18	0

WIMBLEDON.—For alterations and repairs to Cecil House, Wimbledon-common. Mr. W. H. Hawes, surveyor, Wimbledon:—

Messrs. George & Harding (accepted). £578 0 0

Clock-Tower and Drinking-Fountain, Southampton.—Our printers contrived to make two gratuitous blunders (unfortunately undetected by us) in the list of tenders for this work, published in our last. Tender B amounted to £703. 10s., instead of £603. 10s., and this tender was clearly marked in the copy as the one accepted.

Cemetery Chapels, &c., Sutton.—Messrs. Arthur M. Deacon & Co., of West Norwood, write to say that their tender, amounting to £3,671, for cemetery chapel, &c., for Sutton Local Board, was omitted from the list. We printed the list as we received it, so that the omission was not ours.

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D. W. W. (not likely you could do it under about 1,400*l.*, unless it were very "jerry" work. The book you allude to is rather out of date now, but its place has not been exactly filled).—R. S. R. (thanks).—A. E. F. (cannot advise. Perhaps the Secretary of the Institute of Builders could direct you).—J. H. (we have already given illustrations and a good deal of information about the ancient manor house referred to).—J. W. & Co. (shall have attention).—E. & G.—S. & H.—H. R. M. (list of tenders received too late. They shall appear next week).—C. H. A. (too late this week).—J. M., Norwich (thanks).

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

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